

Document No. 21.

STATE OF NEW JERSEY.

NINETEENTH ANNUAL REPORT

OF THE

State Board of Agriculture.

1891-92.

To the Governor and Legislature of New Jersey :

In accordance with the provisions of the act creating the State Board of Agriculture, adopted April 22d, 1884, I have the honor to present the annual report for 1891.

FRANKLIN DYE,
Secretary.

TRENTON, Mercer County, N. J., Feb. 24th, 1892.

STATE BOARD OF AGRICULTURE.

OFFICERS FOR 1892.

PRESIDENT.

HON. EDWARD BURROUGHCamden.

VICE PRESIDENT.

MORRIS BACONGreenwich.

TREASURER.

D. D. DENISE.....Freehold.

SECRETARY.

FRANKLIN DYE.....Trenton.

EXECUTIVE COMMITTEE.

PROF. E. B. VOORHEES.....New Brunswick.

WM. R. LIPPINCOTTFellowship.

H. F. BODINE.....Locktown.

ALSO,

THE PRESIDENT, VICE PRESIDENT, SECRETARY AND TREASURER.

BOARD OF DIRECTORS
New Jersey State Board of Agriculture.

1892.

Term of Office from January 1st to January 1st.

Class A.

NAME	ADDRESS.	ASSOCIATION.
EMMOR ROBERTS.....	Moorestown	Geological Survey.
Hon. THOS H. DUDLEY.....	Camden.....	} Board of Visitors, Agricultural College.
WM. R. WARD.....	Newark	

Class B.

JAMES NEILSON.....	New Brunswick.....	Director Experiment Station.
E. B. VOORHEES	New Brunswick.....	Professor of Agriculture.
JOHN STATESIE.....	Colt's Neck.....	Master of State Grange, P. of H.
M. D. DICKINSON.....	Woodstown.....	Secretary State Grange, P. of H.

Class C.

Hon. THOS. H. DUDLEY.....	Camden.....	} State Agricultural Society.
P. T. QUINN	Newark.....	
I. W. NICHOLSEN.....	Camden.....	} State Horticultural Society.
E. P. BEEBE	Elizabeth.....	
J. H. BALDWIN.....	Orange.....	} N. J. State Poultry Association.
E. S. HAMMILL	Jamesburg.....	
Dr. J. H. BRAKELEY.....	Bordentown.....	} American Cranberry Growers' Association.
Hon. A. J. RIDER.....	Trenton.....	
V. R. MATHEWS	Ringoes.....	Hunterdon Pomona Grange.
WM. H. BORTON.....	Mickleton.....	Gloucester Pomona Grange.
JAMES LIPPINCOTT.....	Mount Holly.....	Burlington Pomona Grange.
IRA STOUT.....	Pennington	Mercer Pomona Grange.
LEVI S. PRICKETT.....	Woodstown.....	Salem Pomona Grange.
JOSEPH B. WARD.....	Newark.....	Central District.

(The above hold office for one year.)

BOARD OF DIRECTORS.

NAME.	P. O. ADDRESS.	TERM.	ASSOCIATION.
WM. A. ELVINS.....	Hammonton.....	2 years..	} Atlantic County Board.
V. P. HOFMANN.....	Egg Harbor City..	1 year..	
THOS. J. BEANS.....	Moorestown.....	2 years..	} Burlington County Board.
JOSHUA FORSYTHE.....	Pemberton.....	1 year..	
EDWARD S. HUSTON.....	Haddonfield.....	2 years..	} Camden County Board.
AMOS EBERT.....	Ashland.....	1 year..	
W. O. GARRISON.....	Bridgeton.....	2 years..	} Cumberland County Board..
FRANKLIN SHARP.....	Bridgeton.....	1 year..	
AMOS W. HARRISON.....	Livingston.....	2 years..	} Essex County Board.
FRANK GOBLE.....	Caldwell.....	1 year..	
DAVID T. BROWN.....	Mickleton.....	2 years..	} Gloucester County Board.
THOS. D. BROWN.....	Clarksboro.....	1 year..	
Hon. B. E. TINE.....	Stanton.....	2 years..	} Hunterdon County Board.
JOHN B. FISHER.....	Sergeantsville.....	1 year..	
RALPH EGE.....	Hopewell.....	2 years..	} Mercer County Board.
S. B. KETCHAM.....	Pennington.....	1 year..	
SAMUEL BLISH.....	New Brunswick..	2 years..	} Middlesex County Board.
J. M. WHITE.....	New Brunswick..	1 year..	
H. V. M. DENNIS.....	Freehold.....	2 years..	} Monmouth County Board.
C. D. B. FORMAN.....	Freehold.....	1 year..	
WM. F. ELY.....	Madison.....	2 years..	} Morris County Board.
DAVID A. HOPPING.....	Hanover.....	1 year..	
EMPSON ATKINSON.....	Woodstown.....	2 years..	} Salem County Board.
ADAM S. GRAFF.....	Elmer.....	1 year..	
JOSEPH FITZGA.....	Somerville.....	2 years..	} Somerset County Board.
J. S. HOAGLAND.....	Harlingen.....	1 year..	
A. J. MCBRIDE.....	Unionville.....	2 years..	} Sussex County Board.
S. J. MARTIN.....	Deckertown.....	1 year..	
NOAH W. PARCELL.....	Elizabeth.....	2 years..	} Union County Board.
DENNIS C. CRANE.....	Westfield.....	1 year..	
WM. O. WARD.....	Hainesburg.....	2 years..	} Warren County Board.
JONATHAN BILBY.....	Hackettstown.....	1 year..	

REPORT OF THE EXECUTIVE COMMITTEE.

To the New Jersey State Board of Agriculture :

Convened once more in annual meeting your Executive Committee extend to the State Board cordial greetings. It is a satisfaction to know that during the year past so few of our members have been removed from us by death, although we have to record the fact that here and there one, prominent and useful in his neighborhood and as a member of this Board, has been called to lay off his armor. Their departure calls to renewed diligence those who are left on the field of labor. The year 1891 will be remembered as a year of abundant harvests in almost every branch of husbandry, but none know so well as the husbandman that large yields do not always mean large profits to the farmer, although this is the common inference by many in other professions. Market-gardeners, truck-farmers and fruit-growers, who depended chiefly on these branches for their income, have not done a paying business the season through ; while, owing to the foreign demand, prices have advanced to the grain-growers, and those who have had grain to sell as their main crop have done better than last year. Taking the season through for all crops, especially to the general farmer, we believe the financial condition of the farmers of the State is a little in advance of what it has been during a few years past.

Your committee have endeavored to do all in their power since the last annual meeting to advance the interests of the farmers of the State. Ten meetings of the committee have been held in the interests of the Board, and sub-committees have been appointed for special purposes. Reports from these committees are embodied in this report.

REPORT ON FAIRS.

The year 1891 being almost unprecedented in abundant crops, the exhibits of fruit, vegetables, and cereals were more than ordinary in

quantity and quality. More attention seemed to be devoted to the display of these products and less to the exhibition of machinery. The season having been favorable for the action of fertilizers in promoting the growth of various crops, many exhibits went far to show that agricultural chemistry had done much for the farmer by increasing his crops, lightening his labor, and proving that to be successful he must think as well as toil. Great improvements in machinery and methods of cultivation were clearly demonstrated by the long array of superior products exhibited. The cereals were fine, and good crops of grain were generally reported, with the exception of some localities where smut had injured the wheat, and several farmers reported their straw filled with honey-dew that prevented it from drying. The individual exhibits at an agricultural fair indicate, in some measure, the progressive character of the people. So, too, the displays made by Granges and Farmers' Clubs show that their members have taken the highest rank in farming, and their skill and enterprise reflect credit upon themselves, their county and their State. The products of the house, the fruits canned and preserved in every style, the bread, cakes and pies, and the exhibits of dairy produce, keep pace with outside improvements and prove that the real secret of many a farmer's success is largely due to his wife's skill and energy. Among the different breeds of cattle exhibited a great number were accredited to other States; and many a fine herd in New Jersey that would have been a credit to the owner remained in the home pasture and the prizes passed beyond the State line. The horse that is fleet of foot and the side-show seem to be essential to the financial success of every State or county fair. Different tastes require different amusements, and seek them from opposite sources. The fair may be called agricultural, but the crowd is cosmopolitan. While New Jersey ranks high as a garden State, the real value of her soil, climate and productions would be better appreciated by displaying her products at the fairs of other States. This has been a favorite idea with the President of the State Board of Agriculture, and when carried into effect will fully demonstrate that New Jersey's undeveloped land offers greater inducements to settlers than any other part of the Union. The most marked improvement at fairs is in the farmers themselves. Not in the crowd that comes to see the fun, but the men whose brains and hands run the whole machinery of the farm. With health in their sturdy frames, and with good humor and intelligence in their

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faces, they look the peers of any men on earth. If our fairs can be made and kept agricultural in character, as well as in name, they will continue to aid in the promotion of a higher agriculture and horticulture in the State.

FARMERS' CONGRESS.

A communication was received by the Governor from the Secretary of the Farmers' Congress, asking that delegates be appointed and commissioned from this State to attend the Congress, and the Governor kindly consulted with the Executive Committee as to the advisability of making such appointments. As the communication came quite late, and the experience of the past shows that where delegates have to pay their own expenses and give their time they do not always care to go, even if appointed, the committee suggested to His Excellency that no appointments be made for the last Congress.

NATIONAL BOARD OF AGRICULTURE.

Verbal and written communications have been made to Hon. Secretary Rusk, urging that something be done looking to the formation of a National Board of Agriculture, but he has as yet made no response to that part of our communication.

PERMANENT CENSUS BUREAU.

About the first of October a letter was received from Hon. R. P. Porter, Superintendent of the Eleventh Census, asking an expression of views for or against a permanent Census Bureau. A reply favoring the establishment of such a bureau for the agricultural interests was given on the ground that a United States Bureau is necessary for tabulating the statistics of the different States and publishing and distributing them for general use. At the same time the view was expressed that the States themselves, through their organized Boards or Departments of Agriculture, are the proper agencies by which this work in the several States should largely be done; that agricultural statistics should be secured by the Assessors from the farmers each year and sent to the Department of Agriculture of each State, which statistics could be used by the permanent Census Bureau at

Washington for comparison and wider distribution. The committee believe that statistics collected by State and township officers who have an interest in their States' advancement would be more popular and more reliable than if secured by non-residents having no particular interest in the State.

INSTITUTE WORK.

In the County Boards there is a growing evidence of usefulness and efficiency, and several counties have expressed their desire for Institute work. Your committee feel that this is a very encouraging sign, showing as it does that our farmers are taking a new interest in the advancement and elevation of their profession. No less than eight Institutes will have been held before the winter closes, besides a lecture course from the State Agricultural College secured by the County Board of Monmouth county to the farmers of said county. This course comprised twelve lectures by the Professor of Agriculture, E. B. Voorhees, on practical agricultural topics. We believe it would be a just demand on the part of this Board to ask the Legislature to appropriate at least \$2,000 annually for Institute work in this State. This would give each county one good Farmers' Institute each year. It has been already clearly demonstrated where such Institutes have been held from year to year in other States, that the material interests of such States as represented in agriculture have been greatly advanced, and consequently the State made that much richer, for agriculture is a productive industry.

Many resolutions are passed by farmers each year, condemning existing legislation in some directions, or asking for new legislation in order to advance the interests of agriculture. But if farmers generally would concentrate their efforts through their County Boards, they would be more likely to secure a hearing in the Legislature. Your committee forbear suggestions in the direction of needed legislation, believing that the desires of the farmers will be expressed through their County Board reports and in other ways, to the State Board, and that the combined wisdom of the farmers here assembled will lead to safe recommendations.

In attending the County Board and Farmers' Institute meetings during the year, members of the Executive Committee have been gratified to observe the degree of practical efficiency imparted to such

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meetings through the addresses of the able corps of Professors of the State Experiment Station. These gentlemen have to deal with the scientific side of agriculture, but they possess the faculty too often lacking in scientific men—of putting their investigations and discoveries into such language that intelligent farmers can reduce them to practice in actual farm work. Other subjects in connection with our Experiment Station work are the series of experiments with fertilizers in connection with growing crops, of investigation and treatment of fungous diseases, and of tests of insecticides in different parts of the State under the personal supervision and direction of Professors Voorhees, Halsted and Smith. The value of the work of the State Chemist, Professor Voorhees, in the field of fertilizer analyses, is so well known and appreciated by our farmers as to need no special indorsement by this committee. The number of fertilizers analyzed and the bulletins issued, giving their component parts and commercial value, have been a great protection against fraud on the part of the manufacturers and a promoter of intelligence among the farmers, giving them a knowledge of the kinds of plant-food required for different crops and the manner of applying them. The movement for University Extension, inaugurated by President Scott, we look upon as an enlargement of the Farmers' Institute, and capable of inestimable value to the farmers of any neighborhood who will avail themselves of it. Monmouth county has already moved in this respect. The Sussex County Board, too, by a small contribution from its leading farmers, has availed itself of the valuable services of a leading dairyman of the country, who has given them two addresses on this important subject. The "short course," so called, started at the State College last winter, seems not to have met with the support and encouragement its importance and value to our young farmers demand. We would encourage the farmers of the State to work in full sympathy with the forward movement in their behalf inaugurated by the College, and we also invite the College Faculty to continue the good work begun in the way of lectures by the Professors at our County Board and Farmers' Institute meetings throughout the State. In this way the benefits of science will be brought into active sympathy with the practical agriculture of the present time.

STATE BOARD OF AGRICULTURE.

REPORT OF THE SUB-COMMITTEE'S ACTION ON THE
RESOLUTIONS.

In their effort to carry out the purpose and spirit of the foregoing resolutions, a sub-committee of the Executive Committee, consisting of the President, Edward Burrough; the Professor of Agriculture, E. B. Voorhees, and the Secretary, Franklin Dye, presented the resolutions to the State Board of Education, through the State Superintendent of Public Schools, on June 25th; and it was referred to the Committee on Education, with the understanding that said committee would give a hearing upon the matter to representatives of the State Board. Accordingly, on September 16th the committee were invited and met with the Committee on Education at the Normal School building, and were granted a hearing. After some opening remarks by President Burrough, reciting the position and demand of the State Board of Agriculture, Professor Voorhees addressed the Board of Education Committee, presenting the following statements as a basis of arguments in favor and in justification of the demand made, to wit:

1. That successful farming under the conditions now existing in New Jersey, and which are likely to continue, requires a broader knowledge of the principles that underlie reasonable practice.

2. That the means of education, now generally accessible to the farmer, are inadequate to his needs, and that proper means are inaccessible.

3. That the introduction of the study of agriculture in the country public schools is legitimate, since its pursuit fulfills in an eminent degree the true aim of education.

4. That in those countries where instruction in agriculture is a feature of public school work, it has been amply proven that it can be successfully taught, resulting in a higher intelligence and more permanent prosperity among the farming classes.

5. That the introduction of the study of agriculture in the public schools of the State will not materially increase the present cost of public school work.

The Secretary of the State Board of Agriculture presented for the consideration of the committee the following reasons, viz.:

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1. Agriculture lies at the basis of all other industries; and general, continuous prosperity is dependent largely upon a prosperous agriculture.

2. Agriculture can only be made to reach its largest possibilities when it is directed by minds educated to understand the laws of nature that control germination and growth in fruit, vegetable, plant and animal life.

3. The want of such knowledge is widespread, and education in this particular will become general only as it is generally taught, *i. e.* in the common schools.

4. The recognition of this defect in our educational systems has given rise to agricultural colleges, which, however, begin their work too far from the starting-point of education.

5. Our agricultural colleges and scientific schools, coupled with the close competition and depression of agriculture, have emphasized the necessity of beginning the study of natural things in the formative or educational period of child life, thus preparing the youth for the higher education at the agricultural college and on the farm.

6. This demand is not for sectional, denominational, nor class education.

(The arguments following are on file in the office of the Secretary.)

The committee were cordially received, and were assured that all that could be done in the direction named by the State Board of Education would be done. Dr. Butler stated that since the resolution had been presented to them they had taken pains to ascertain existing provisions in the Normal School curriculum for teaching the branches indicated, and found that there is but little, if any, expansion required. As to the enforcing of this sort of teaching in the public schools by the Trustees thereof, the committee stated that our Board and the farmers of the State could do more in this particular than is in their power to accomplish. A serious hindrance to securing advantages already possessed by our public schools, is the generally irregular attendance at school by the youth of the State; and the committees of the Normal School and of the State Board were unanimous in their opinion that some additional means should be adopted to secure the attendance of the children at the public schools. Dr. Butler, chairman, on behalf of the Board of Education, stated in brief that teachers who were qualified to give instruc-

tion in the branches named, could command a larger salary than is usually paid in country schools, and that to make this demand successful, by securing capable teachers, it would be necessary for districts desiring such instruction to raise an additional sum to that now appropriated from the school funds of the State. Various other matters in connection with the subject of education in this State were discussed by the two committees, and at the close of the meeting the new addition to the Normal School buildings and the changes made in the old, were inspected by invitation of the school committee, and your committee feel gratified that so much is being done for the educational interests of New Jersey by the State Normal School at so moderate an outlay of public money. It is but just to say in closing this report that the Committee on Education have, since our meeting, introduced into a number of Teachers' Institutes in different parts of the State, lectures on the subject of Scientific Agriculture in some of its branches.

In connection with the above report the Executive Committee feel it important to call the attention of the State Board of Agriculture to the necessity of devising some plan to enforce existing laws, and to secure further legislation, if necessary, in the direction of compulsory education. One of the complaints of increasing taxation is the school tax, and it seems unfortunate that money should be raised and teachers hired for the purpose of educating the children of the State, and yet the children allowed to attend school at will, or be kept out of school for what, it is claimed, they can earn. This failure to attend school is most noticeable during the months of September and October and the months of May and June, the pleasantest seasons of the whole school year for scholars in the rural districts to be in attendance and at their studies. Education is absolutely necessary to intelligent citizenship in a government such as ours is. It is also more and more manifest that the agriculturist of the future, if he is to succeed, must be well educated, and a part of that education must be in those branches indicated by the foregoing resolutions. Will not this Board devise and recommend some plan which shall secure to the children of the State a certain number of months of education each year during their school age?

"The number of children of school age, or between 5 and 18 years old, in the State, is 273,982. Of this number there are enrolled only 124,384; less than half. The number who attend school 10 months

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or more during the year, 7,022; number attending 8 months and less than 10, 52,032; number attending 6 months and less than 8, 20,084; number attending less than 4 months, 30,439; average attending school, 81,228. Of the total number of school age, 149,598 are not enrolled at all, and but 7,022 of the number enrolled attend school 10 months or more during the year." (From report of State Superintendent of Public Instruction.)

In the light of the above figures it is evident that something ought to be done to enforce attendance at school.

A section of the act on compulsory education, passed a few years since, provides for the appointment of a suitable person, by district officers, to enforce attendance at school; but while the act empowers Boards of Education to determine the compensation of such officers, it does not state where the money is to come from. A suitable amendment to the act referred to might be helpful in correcting the evil spoken of. Farmers being Trustees in the rural districts, have the key to the situation there, and if our farmers, generally, through their existing organizations, Granges, County Boards and Alliances, will take the matter up in earnest, we believe existing obstacles to general and satisfactory education will be overcome.

THE ROAD QUESTION.

The subject of building and maintaining good wagon roads throughout the State is one of growing importance, and justly so. The question has been agitated and discussed by this Board for years, and some good results have followed in the way of needed legislation. We have, however, thought it advisable to call a convention of citizens throughout the State who are interested in this subject as taxpayers and users of public highways, to discuss this question in all the phases its importance demands. The convention is called to follow the meeting of this Board, so that the farmers of the State could be present with slight additional expense, and that other citizens could discuss this subject with them. We believe that the time has come when a general forward movement should be made in the direction of better roads. Railroad corporations are taxed, and justly so, and it is in the interest of all railroads that good wagon roads be maintained to facilitate travel and the transportation of produce to the several stations. It seems eminently proper, therefore, that an annual appropriation from the taxes named be devoted to the

improvement of our leading roads. One hundred thousand dollars a year used in this way, under some such law as was passed last winter, would, we believe, revolutionize our State in a short time, and make it more and more attractive as a place for country homes by city business people, and increase the value of property generally. We trust excellent results will follow the discussion of this subject at the convention named.

The action of the late session of Congress in passing an act refunding to the several States the "Direct Tax," raised for the support of the government at the breaking out of the Rebellion, whereby there was refunded to the State of New Jersey the sum of \$383,614.83, attracted the attention of the President of this Board, and hoping to secure a permanent Road Improvement Fund for the State without additional tax to the citizens, the Executive Committee on March 9th took the following action, which explains itself. A copy was sent to His Excellency the Governor, and also to the President of the Senate and the Speaker of the House:

"In view of the fact that Congress has voted to refund the 'Direct State Tax' to the several States contributing the same, and as this tax came from the individual taxpayers and should, therefore, in some way be returned to them, the Executive Committee of the State Board of Agriculture would respectfully present for your consideration that said money be set aside as a permanent fund to be known and designated as the Public Road Fund, the income from which should be annually appropriated under specific laws for the permanent improvement of the public roads of the State in the several counties thereof.

"And your memorialists would further present that in thus setting apart this refunded tax, it would be following the precedent of the distribution of the surplus revenue of 1836, which was set apart as a School Fund, around which has gathered our beneficent system of public education.

"The road question is one in which all citizens are deeply interested; we, therefore, feel justified in presenting the above as a feasible and equitable disposition of the funds, and think that it will be fully appreciated by the citizens of our State. And we ask that you give this suggestion your careful consideration."

All of which is respectfully presented.

AMERICAN POMOLOGICAL SOCIETY.

REPORT OF THE COMMITTEE APPOINTED TO ATTEND THE TWENTY-THIRD BIENNIAL SESSION.

The American Pomological Society held a meeting in the city of Washington, D. C., September 22d, 23d, 24th, 1891. This meeting called together the pomologists, professional and amateur, from many parts of the United States and Canada. Many interesting papers were read and important subjects came up for discussion, while the listener had an opportunity of hearing broad views on the fruit question, as far, at least, as latitude and longitude were concerned. One great truth was forcibly presented, that the difference in soil, climate and locality favored the cultivation of different kinds of fruit requiring different modes of treatment, and every one must judge for himself what new ideas would best apply to his own section.

The fruits on exhibition represented an extensive range of country, varying from pine-apples, lemons and limes of Florida to the hardy varieties of apples that grow upon the plains of Minnesota and Wisconsin. A bronze medal was awarded for quinces from Southern California and another for apples grown in Virginia. Men from so many different localities must have different opinions; but upon one point all agreed, that the greatest importance attached to marketing fruit in proper condition and in sending only the best. The President of the Society in his address touched upon this point in particular, attributing the decline in price to overproduction, improper distribution and the inferior quality of fruit too frequently sent; and he further urged to remedy this evil, that county organizations of farmers and fruit-growers should adopt resolutions that only the finest fruit should be shipped.

Professor Goff cited instances to show that many varieties of fruit are entirely local, and that certain conditions of soil and climate are

necessary to secure profitable returns to the cultivator. Sometimes good fruit districts are of narrow limit, and the fruit-grower's first care should be to ascertain, if possible, what kinds are best adapted to his land.

The fruit list, carefully prepared by the Society, embraces 369 varieties of apples, 126 of peaches, 120 of pears, 53 of plums, with a long list of small fruits and nut trees, numbered and named, while the size, color, quality and time of ripening of each variety is carefully marked, and the States in which it is known to flourish best are designated by stars.

This extended list is confusing to the amateur grower, and it should be a point of honor in nurserymen to use their best judgment in recommending trees that are adapted to the proper localities.

While in small fruits the size has been wonderfully improved and the list largely extended, the quality of the strawberry has never improved since the introduction of the Hovey variety, more than forty years ago, and, like the larger fruits, the question of varieties is a local one, and the judgment of the grower must be based upon the kinds that flourish best in his immediate vicinity and find the most ready sale in the market. A certain speaker very wisely remarked that more could be learned from your neighbors than from any one else, because their experience was similar to your own, their difficulties much the same, and any improvement or discovery made in their interest could be applied to your advantage.

Mr. Hale, of Connecticut, said: "Three-fourths of the small fruit-growers lost all the profit after the fruit was grown, by not studying the market end." Success comes from the selling as well as the growing, and any one who will spend a day in the berry market and examine the packages will be fully convinced that much of the farmer's trouble comes from this source; he gets the quantity into market regardless of the quality.

Interesting papers were read on the chemistry of the peach yellows, and the different remedies applied for its cure and prevention were carefully explained, but this troublesome disease has not yet yielded to treatment. In the mountain regions of Virginia and adjoining States, the peach trees have never been affected. The fertilization of plants formed a very interesting subject. The method of crossing or hybridizing, by collecting the pollen of one flower and transferring it to another, and surrounding the plant with a netting to keep the insects

from disturbing it, proved how much we are indebted to scientific men for many of our excellent fruits. While the insects do most of the fertilizing, they are not particular what kinds they mix together, and the result is not always satisfactory.

The new and promising fruits and nuts of the United States were described by the Chief of the Department of Pomology, and there seems to be a large field for experiment in testing the varieties recommended, and it is supposed that many of the new kinds will pay well for cultivation. Interesting information and historical reminiscences in fruit culture came in a "Voice from Virginia." Early in colonial history the landed proprietors came with their families, and brought with them many of the valuable fruits of England, France, Italy and Germany. The results of their efforts of two centuries ago are to be found throughout the whole apple-belt, and cherry trees one hundred years old are still bearing along the Piedmont slope. The report of the Eleventh Census shows that fruit-growing and horticulture are becoming great industries in the country, and it will not be long before the available fruit lands will be filled in the spring with the odor of blossoming fruit, and nut trees will adorn the hills. The subject of pruning called out a diversity of sentiment in reference to cutting and shaping trees to improve their growth and increase their crop of fruit. One speaker claimed that pruning disturbs the regular order of nature, that the top and roots of a tree are intended to balance in the general economy of growth, and any disturbance of nature's arrangement by cutting the branches with a knife or the roots with a plow was detrimental to the tree, lowering its vitality and rendering it an easy prey to insects. Another gentleman argued that cutting both branches and roots improved the tree, made it longer lived, increased the quantity of the fruit, and improved the quality. Late autumn, after the leaves have fallen, was recommended as a good time for pruning an orchard. Reports from Canada show that the exports of fruit from that country are largely on the increase. In 1881 not much over 3,000 barrels were shipped, while the export had increased to 1,500,000 barrels in 1889, with good prospects for the future.

The proper distribution of products seems to be one of the most important questions to the agriculturists of the United States. If the schools of scientific agriculture, the experiment stations, State and County Boards have taught the farmer how to raise large crops, it remains for the political economist and the statesman to instruct

him where to find the best market, and how to get paid for his labor. There is nothing so demoralizing to the intelligent cultivator of the soil as to find that his labor, care, and years of careful investigation, have produced crops that find no sale in an overcrowded market. Too much food is not often raised. If the supply could find its proper outlet, either for immediate consumption or to be preserved for future use, the cry "Overproduction" would seldom be heard. But with present methods of marketing and distribution of crops, the farmer's surplus is a more vexed question than the surplus in the United States Treasury, and cannot be so easily disposed of unless treaties of reciprocity will hasten the time—

"When around the world each needful product flies,
And every country shares the world's supplies."

W. R. LIPPINCOTT,
FRANKLIN DYE,
Committee.

REPORT OF THE SECRETARY.

To the Governor, the Legislature and the State Board of Agriculture:

The condition of prosperity of the farmers of New Jersey does not equal their condition of hopefulness. The latter is an encouraging sign and is based upon two important facts, which indicate that better times are surely, even though slowly, coming for the growers of our various food-supplies. One is the rapid reduction in the area of our new government lands; the other the constant and rapid increase of population. With the decrease in public lands, the possibility of producing cattle and sheep on government territory, at a cost but little above caring for them, will soon be taken away from the Western ranchmen. This, it is thought, will stimulate the production of fat stock in the older sections of the country, and where it has been destroyed by this cheap method of production. Another cause for present hopefulness on the part of grain farmers, at least, is the increased price of cereals. This, as is generally known, is owing to a brisk foreign demand. Farmers who are depending chiefly on truck and fruit have not had a prosperous year, as the supply was so far in excess of the demand as to make prices low; too low, indeed, much of the time, to cover expenses of growing and marketing. The conditions of the two classes of farmers are exactly opposite that of last year.

The following question relating to the condition of prosperity of the farmers of the State, was sent to leading farmers in the several counties in October, to wit: "One hundred denoting a prosperous year for farmers, what is their condition of prosperity for 1891?" An error in printing substituted "prospects" for "prosperity," but the question was evidently understood. Some correspondents failed to answer this by percentage, but from a number who did, representing sixteen counties, the degree of prosperity and prospects is 85 per cent. Extracts from a number of replies on this point are given:

Atlantic County.—Heavy crops, but very little money.

Camden County.—(From a truck farmer.) The worst year for five if not ten years past. It took from four to five loads to bring as much as one brought last year of same kind of truck.

Cumberland County.—The financial condition of many farmers is better than last year, and with all industrious and prudent men of our calling the outlook is much better. Many are looking forward with renewed hope with regard to their permanent prosperity.

Hunterdon County.—Ninety per cent. If it was not for the high taxes and high rate of interest the farmers are compelled to pay, farming would be fairly prosperous. Taxes have doubled three times in thirty years and the ability to pay has not increased.

Middlesex County.—I think their condition better this year than in 1890, as they will commence the year 1892 with less indebtedness and a prospect of better prices. Another—We should look forward to a prosperous year.

Morris County.—Hay and milk are staples. Increase of price of former about equal decrease of crop. Milk brings a little more than last year; this is balanced by increased cost of production owing to advance in feed.

Salem County.—Better than for two years for grain farmers, but as compared with real prosperity, 75 per cent.

Sussex County.—Fair.

Union County.—The farmers of Union county are largely engaged in raising milk and vegetables, and the average price has been low and labor and taxes high. In my judgment, taking 100 as a prosperous year, the per cent. will not be more than 80.

Warren County.—Better than for some years past.

FARMERS' ORGANIZATIONS AND MEETINGS.

County Boards of Agriculture, of which there are sixteen, and Granges throughout the State, have maintained their usual activity

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and interest. The number of meetings held by each varies, but the aggregate number throughout the State during the year is large. In the County Boards the questions discussed are usually such as have a bearing upon practical agriculture, and this is as it should be; for the State and County Boards are constituted by law to advance and elevate the agriculture of the State, and thereby increase its wealth and prosperity. The Grange being a family organization is devoted to the elevation of the farmer and his family by means of social culture and education; but it by no means neglects the important questions connected with the material prosperity of the farm and home. Members of the above-named and other organizations, and also farmers who are not members of any organization, have enlarged opportunity for discussion and improvement in the Farmers' Institutes, six of which have been held during the fall and early winter, and more are being organized for the months of January and February. The interest in these meetings is increasing, and is very encouraging. Their value is augmented by the presence of the Professors of the State Agricultural College, who deliver lectures on scientific questions, covering the subjects of general agriculture, physics, chemistry, botany, entomology, &c., as occasion may require. It is gratifying to note that there is a growing tendency, both friendly and reciprocal, between our intelligent farmers and the College Professors in this direction. In behalf of the agricultural interests of the State, and as a means of increasing her wealth and prosperity from this source, enough money should be appropriated to hold at least one Agricultural Institute in each county of the State every year, under the direction of the State Board of Agriculture. A good beginning has been made, but a lack of sufficient funds to meet necessary expenses cramps the work where expansion should exist. Two thousand dollars set aside annually for this purpose, or so much thereof as might be necessary, would give the work a good send-off, and place it upon a firm basis. In connection with the above meetings, quite a number of counties hold farmers' picnics immediately after harvest, and it is customary at such meetings to have addresses bearing upon the advancement of agriculture. A new organization, the Farmers' Alliance, has made quite rapid progress in the State during the past year, having organized County Alliances in Hunterdon, Warren, Morris, Monmouth, Middlesex, Salem and Cumberland counties; and a State Alliance. The latter was organized at

New Brunswick November 12th. The purpose and work of the Alliance are set forth in its declaration of intentions, which has been so generally published and discussed that no explanation of the same is necessary here. The hope is expressed, however, that good will result to the farmer, and greater prosperity be given to his business by means of this new addition to farmers' organizations.

The annual meeting of the State Board of Agriculture increases in usefulness and popularity. The papers read, addresses made, and discussions had on practical farming affairs, are of permanent value to the farmers of the State who receive the annual reports. Applications for this report have been made during the year past by persons from almost every State in the Union; from Canada, France and even New Zealand.

FARM LABOR AND WAGES.

A special circular was sent, during the latter part of August, to Secretaries of farmers' organizations and leading farmers throughout the State, concerning the supply of farm labor, both male and female, the price paid per week or month, and requesting expression of views on the questions covered in the inquiry. The questions are as follows:

Q. 1. Is the number of farm laborers in your county sufficient to meet the demands of the farmers?

A. 1. Four replies were in the affirmative, thirteen in the negative, showing that the supply of farm laborers is not sufficient to carry on, as it should be, the farm work of the State.

Q. 2. How does the supply of farm help, as to numbers, compare with five years ago?

A. 2. A majority say that there is less than five years ago, which seems to indicate that the number is growing less from year to year.

Q. 3. How do farm laborers compare with farm help ten years ago, in efficiency and intelligence to do farm work?

A. 3. The majority of answers say farm laborers are, as a class, less efficient and intelligent to do farm work than ten years ago?

Q. 4. What nationality predominates as farm laborers?

A. 4. While a number of foreigners are engaged as farm hands, colored and white American help seems to predominate.

Q. 5. Is the custom of hiring hands by the month or year as general as it was ten years ago, or do farmers depend upon day laborers?

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A. 5. Hands are hired by the month and year in about the same ratio that they were ten years ago.

Q. 6. What are the wages paid single men by the month who board and lodge with their employer?

A. 6. Average price paid by the month, with board, is \$14.37 for single men.

Q. 7. What are the wages paid married men, exclusive of tenant-house and other privileges, per month?

A. 7. Good hands, if they board themselves, receive \$25 per month and house and garden. The price per month varies somewhat according to other privileges; as tenant-house, garden, cow kept, poultry privileges, firewood, &c. Where married men rent their own house and board with employer, their wages are but little in advance of efficient young men.

Q. 8. Is there a manifest desire on the part of farm laborers to work fewer hours, *i. e.* make shorter days than was customary fifteen or twenty years ago?

A. 8. Is answered in the affirmative, quite generally, and shows that the effect of the hour system for a day's work is spreading.

Q. 9-10. Is there a quite general demand for female help in farmers' families? How nearly is this demand met? Give per cent.

A. 9-10. Replies show there is a great demand for female help on the farm, and that the demand is about one-half met.

Q. 11. What wages are paid female help on the farm, per week?

Q. 12. If there is a scarcity of either male or female help on the farm, what, in your judgment, are the causes of such scarcity?

A. 11-12. While prices vary somewhat in different localities, the average price paid per week is \$2.28. The reason for this scarcity of domestic help on the farm, as embodied in the various answers given, is that better wages are paid them at mills, factories, stores, &c.

Q. 13. Can you suggest any measures that might be adopted by farmers' organizations, or by townships or counties, by which the want of such laborers might be supplied?

A. 13. Replies are well summarized in the statement, "Co-operation among farmers and a respect for their calling."

Q. 14. With the present supply and degree of efficiency of farm laborers, what per cent. of farm work now done could be done without the assistance of modern farm machinery?

A. 14. If it were not for improved machinery the farmer of the present would not be able to do more than thirty-seven per cent. of the work now necessary to be done on the farm. To carry on the extended agriculture of the present day would require a much larger force of farm laborers than is now at his command. Improved machinery enables the farmer to get along with less help the season through for the same kind and amount of work than would be possible without the aid of such machinery.

Q. 16. Taking the same number of acres, and the same number and variety of crops, how does the total cost of cultivating, harvesting and marketing compare with ante-machinery days—say, before the advent of the mower, reaper, hay-tedder, &c.?

A. 16. Answers to this question may be summed up as follows: Since the advent of improved farm machinery, farm laborers have become more scarce and wages have advanced, while the prices of farm crops have remained uniformly low. At any rate, they have not steadily advanced and held their own as wages and taxes have. Consequently, taking all farm crops into the estimate and for the whole State, the cost of producing, &c., is no less than it was twenty-five or thirty years ago.

The replies given are a fair statement of the actual condition.

INCREASED PRODUCTION.

The experiment to produce on a decreased acreage what is now grown on a larger area should claim the consideration and effort of our farmers more generally than it now does. By referring to the average yields of the several crops, as shown by the statistical table (see Table 4), it will be seen that it is very low; so low, indeed, that many farmers are doing a losing business. Whatever may be said concerning overproduction, all the arguments in the line of economical and profitable farming lie in the direction of larger crops from a decreased acreage. The question may arise, What shall we do with the balance of the farm, if we do not cultivate it all, as at present there is not much demand for farming lands at a price for which farmers would be willing to sell? While there is no good argument in favor of growing upon a larger area what could be more cheaply raised on a smaller one, there are still other uses to which this land

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could be put, in some neighborhoods at least, and I believe quite generally the State over, namely, the production of lambs, mutton and wool, and also a greater diversity of crops. The number of sheep kept in the State at present is deplorably low considering the adaptability of our soil and crops for this purpose. And all the more in view of the fact that general farming with a view to selling grain has not been profitable. An addition of twenty sheep at \$4 per head profit to 25,000 of our farms, assuming that the other 10,000 are not adapted to sheep-raising, would add to the revenue of each farm \$80 per year, or a total for the 25,000 farms, and thus to the revenue of the State, of \$2,000,000 annually.

The great hindrance to this industry is the abnormal crop of dogs; these curtailed or controlled in some effectual way, the sheep business could be resumed and extended with some assurance of success. Will farmers demand and the Legislature grant the necessary legislation to this end?

Near our growing markets an effort to raise a greater variety of crops may be worth trying.

The term "intensive farming" has a fitting application in New Jersey, where truck-farming and market-gardening are carried on so extensively. With our rapidly-increasing population, and that of adjoining States along our border, this business must continue to grow year by year. As compared with grain or general farming in value per acre of its returns, it already assumes a commanding importance. In the census of 1890 an attempt was made to get the acreage and money value of truck-farming in the United States. In so doing, the States most engaged in this branch were grouped into districts, and New Jersey is put in the New York and Philadelphia district, which comprises the State of New York, Long Island, New Jersey and Pennsylvania. The figures for New Jersey are not given separately. But from the fact that prior to 1860 truck-farming was an infant industry, confined chiefly to Long Island, New Jersey, Delaware and Illinois, and along transportation lines leading a few miles out from the larger northern cities, we may conclude that New Jersey's proportion of the amount realized from the two branches named is large, and all the more so from the fact of her own increase of population, and the vast population contiguous to her markets demanding such products. The two branches named have a combined annual money value in the United States of nearly or quite \$125,000,000.

The truck-farming branch produced \$76,517,155. Deducting cost of commissions, transportation, labor and fertilizers, leaves a net income of \$3,794,122.97. The figures given are for the year 1889—a poor year for some of the products included under the divisions.

Contrast the above aggregate with the cereal crops of the country. It is half as much as the value of the oat crop, one-third the value of the wheat product, and one-sixth the value of our magnificent corn crop. While more study, labor and expense are required to carry on truck and market-garden farming, the profits resulting from good management in these are correspondingly greater than are the rewards following general farming. The accompanying table, taken from the Eleventh Census Report on this subject, will show the relative acreage and value of the crops named :

TABLE I.

	TRUCK.	WHEAT.	OATS.	CORN.
Acres planted.....	534,440	37,170,798	26,431,369	71,970,763
Total value.....	\$76,517,155	\$368,442,611	\$222,048,486	\$754,433,451
Value per acre.....	\$163.00	\$9.91	\$8.40	\$10.48
Profit per acre.....	100.00	.....	.....	.....

Comment is unnecessary. I stated last year "New Jersey is destined to become a market-garden agriculturally." I still hold to that opinion, notwithstanding in some instances and for a part of the season the year just closed has not been profitable to some truck farmers. Let the crops be well diversified, be prepared to meet new demands, and grow for and make your own market. On this subject Rudolphus Bingham, a noted market-gardener of Camden county, says: "I find the interest in gardening and more intense farming is increasing in all sections of our country, and think our State excels all others in location and soil for the purpose."

INTELLIGENCE.

In this progressive, high-pressure age, with competition so close in all lines of business, agriculture, to succeed, must be progressive. The broad fields of this industry invite their enterprising owners to attempt greater things with each new year. Ever-increasing knowledge and intelligence must lead to progress and prosperity. The

means and methods of twenty-five years ago will not do in every case now. The agriculturist of the present must make a wise use of brain-power. Every branch of this varied industry must be carefully investigated, and the intimate relation between cause and effect noted; for in no other business is the resultant product so likely to be in an exact ratio to the cause or causes expended to produce it. All sources of reliable information, whether the agricultural press, the farmers' meeting or the lecture, must be utilized.

Our noble calling, the first occupation of the race, will not reach the high place it deserves in the estimation of mankind until those engaged in it make it attractive and worthy of respect.

Knowledge and application by the individual farmer, and organization and co-operation by farmers as a class, will revolutionize the business both as to financial prosperity and social elevation.

MARKETS AND MARKETING.

Another thing that claims the attention of the farmers of the State is the devising of a plan whereby they can sell to a better advantage the crops they grow, and this can be done successfully only by united action and co-operation. *The relation of producer and consumer should be studied by both, and if judicious action be taken it would result in advantage to each.* For it is a fact that occurs almost daily throughout the year, and from year to year, that while some markets are overstocked with produce, there are various other localities that have a comparative dearth; and it has grown out of the custom of consigning our marketable crops almost entirely to the large centers, as New York, Philadelphia, Newark and other similar cities, while local markets and rural towns are frequently overlooked by the farmers. It is to this point I direct particular attention. If producers of the several crops in a given neighborhood would form a co-operative association for buying and selling, and employ a suitable person as their agent to keep producers in touch with the best markets from day to day (as suggested by D. D. Denise, of Monmouth), it would be possible to soon build up a trade in almost any direction where now the supply comes through the dealers in large cities who reship to retailers in local towns. This supply is frequently found far below the demand, while the price is above what consumers need to pay, and below what farmers might receive, providing they are brought in

touch with each other. This plan, or some similar one, would be of mutual advantage. This part of their business farmers have trusted too much to luck, or to the middleman, for their own good. Care, cost and diligence are given to the preparation of soil, manuring and cultivation of crops, but the disposition of them when grown is left largely to uncertainty. I will not dwell on this point, as I believe the wisdom of our progressive farmers and fruit-growers will be equal to the question, if they once take it up in earnest.

AGRICULTURAL STATISTICS.

Another growing need is the annual collection of statistics covering all agricultural crops, as acreage devoted to each, annual yield, prices, &c., also number of head of different kinds of stock, value per head, and annual value of product of the same sold. It is only in this way we can learn what our State is doing and what she is capable of doing, and thereby advertise her possibilities. The United States Census is taken once in ten years, and, whether correct or incorrect, is the general basis of calculation used. A number of Western States and Texas have inaugurated a State system for this purpose, which is worthy of imitation. The value of reliable statistics of this great industry should not be underestimated. The importance of the agricultural products of the United States has been well shown this year in relieving our country from threatened financial disaster. The monthly crop reports, prepared and circulated by the United States Department of Agriculture, are the most valuable for the whole country, because the most reliable now issued. And whether a permanent Census Bureau is established or not, this branch of the agricultural work should be maintained and encouraged. But crop reports, made by parties interested only in speculation in agricultural products, are not to be trusted. The only means in our power now for collecting statistics are of the benevolent and voluntary character, and is, therefore, meager and lacking in comprehensiveness.

No other persons are so well suited to do this work as the Assessors of the several townships, nor can it be done at less expense by others. If it is important that statistics of manufacturing and other industries be collected by law and paid for at the public expense, there is no just reason for not granting equal advantage to the farming industries of the State.

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FOREST FIRES.

In connection with the improvement of our new and hitherto unoccupied land, especially in the southern part of the State, I call attention to the disastrous results from forest fires, and in three particulars—First, the destruction of forests of cedar and pine, some of it large enough to be utilized as timber, some of it in such a stage of growth that in a few years it would add greatly to the revenue of the State, and particularly to the sections where it is found. Our total lumber product has been several million dollars annually—not less than five millions. These figures show that it is a product not to be wasted by consuming fires if a remedy can be devised to prevent it. Second, one of nature's methods for making land productive is to clothe it with vegetation in some form. Soils are made not only by rock disintegration, but also, away from our mountain ranges, and on our sandy plains, by growing and decaying vegetation. Every encouragement, therefore, should be given to the growth of either grass, or bush, or tree, on our non-productive lands; for as these increase, soil will be deepened and made fit for the experiment of agriculture much sooner than if left bare to the scorching summer sun, and exposed to the drifting winds of winter. Third, *it requires a much longer time for a new growth of young forest to set in after having been devastated by fire than it does after depletion by the axe*; and the growth is not so compact, uniform nor vigorous after the former as it is after the latter. It may not be so easy to suggest a remedy by which forest fires can be prevented, but it may be possible to check their force, if not to hold them in complete control. So far as railroads are concerned it would seem that in connection with track-walkers, and those who have charge of the construction and repair of said roads, there should be a lookout on each train, who should be required to keep watch and give notice of any fire that might be seen on the route; such notice to be immediately sent to the nearest station and employes named, and they required to put it out forthwith. In this, or some similar manner, fires started by railroad engines would not gain much headway. The State Geologist suggests "that large forests should be broken into sections by having a piece of sufficient width kept clear of wood-growth. This would enable those having charge, as stated, to keep a fire that might otherwise gain much headway, confined to a certain portion of the forest."

NEW LANDS AND IMMIGRATION.

Through the wide dissemination, by means of our annual reports, of the addresses given at our annual meetings respecting the producing power of lands hitherto uncultivated in our State, and by articles written on the same subject for the press by members of the Board and others, a wide interest has been created ; and many inquiries made by letter from parties in this country, and by foreigners, concerning the location, price, character and capability of our new lands and unoccupied farms. This has resulted in the formation of a number of colonies which bid fair to succeed. Some have already established themselves firmly, and revealed a state of things not known to exist a few years ago, that the sands of Southern New Jersey are capable of profitable cultivation. This movement for bringing into profit territory that is now comparatively valueless, and farms in the older-settled portions that might be bought at fair prices, should receive stronger encouragement. If rightly directed it would add greatly to both the wealth of the State and also to its population, but suitable direction is very important, and some legislation at this juncture of our history seems necessary—legislation empowering the State Board of Agriculture to collect, compile and publish a report which would show persons seeking a farm or a country home the location, character of soil and value of lands for sale in the several counties of the State, with the markets, transportation facilities and other advantages. The Legislatures of New Hampshire, Vermont and Massachusetts have already taken action to bring their unoccupied lands to the notice of immigrants, and New Jersey may well do something to bring to the notice of *desirable settlers* her hitherto uncultivated lands. The newer Western States have been doing this on a large scale, hence their increasing wealth, population and power. It has been my desire to bring out such a report. The expense of collecting and compiling it would not be great. Anything, whether intentional or unintentional, that may tend to depreciate the value of New Jersey as a farming and market-garden State is in the face of facts clearly demonstrated in the other direction. The value of the products per acre of New Jersey's farms is greater than any other State in the Union. The following table will show the value per acre of farm crops of twenty-six States, arranged in the order of their annual production :

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TABLE II.

VALUE OF FARM PRODUCTS PER ACRE—U. S. CENSUS 1880.

New Jersey.....	\$10 26	Wisconsin.....	\$4 77
New York.....	7 45	Vermont.....	4 54
Connecticut.....	7 37	Minnesota.....	3 70
Rhode Island.....	7 35	New Hampshire.....	3 63
Massachusetts.....	7 31	California.....	3 50
Michigan.....	6 55	Missouri.....	3 45
Illinois.....	6 45	Maine.....	3 36
Ohio.....	6 41	South Carolina.....	3 11
Pennsylvania.....	6 09	Tennessee.....	3 00
Delaware.....	5 80	Virginia.....	2 43
Maryland.....	5 72	Florida.....	2 29
Indiana.....	5 61	Kentucky.....	2 28
Iowa.....	5 49	Dakota.....	1 54

This is according to the census of 1880, and it must be borne in mind that in these estimates all lands of our farms, both poor and good, and the poor farming as well as the good, are included in making the estimates. Ordinarily, the nearer the market the crop is raised the greater its value. This being the case, the proximity of New Jersey to good markets should be taken into consideration. A glance down the table will show that as we move away from near markets the value per acre of crops produced decreases rapidly. In the third table the value of the total products per farm in the States named is given, and these two tables will be very instructive to those who are seeking a country home, as well as any who are contemplating a westward or southern move.

In Table III. it will be seen that taking the size of the farm into consideration, New Jersey excels them all in the value of her annual products per farm. In California it takes 231 acres to produce \$830, while in New Jersey 85 acres produce \$872; so in Illinois it takes 124 acres to produce \$800—\$72 less than is produced in New Jersey from 85 acres, and so on. We do well, therefore, in speaking in praiseworthy terms of our State, and in calling attention to it as a good place in every respect to live.

TABLE III.

VALUE OF PRODUCTS PER FARM.

STATES.	Number of farms.	Average size in acres.	Value of total products per farm.	Value of products per acre.
California.....	35,934	462	\$1,680 00	\$3 50
New Jersey.....	34,307	85	872 00	10 26
Illinois.....	255,741	124	800 00	6 45
New York.....	241,058	99	738 00	7 45
Iowa.....	185,351	134	736 00	5 49
Delaware.....	8,749	125	726 00	5 80
Maryland.....	40,517	126	721 00	5 72
Massachusetts.....	38,406	87	636 00	7 31
Ohio.....	247,189	99	634 00	6 41
Vermont.....	35,552	137	622 00	4 54
Rhode Island.....	6,216	83	611 00	7 35
Pennsylvania.....	213,542	93	607 00	6 09
Indiana.....	194,013	105	590 00	5 61
Connecticut.....	30,598	80	590 00	7 37
Michigan.....	154,008	90	590 00	6 55
Wisconsin.....	134,322	114	543 00	4 77
Minnesota.....	92,386	145	537 00	3 70
Missouri.....	215,575	129	446 00	3 45
South Carolina.....	93,864	143	446 00	3 11
New Hampshire.....	32,181	116	421 00	3 63
Virginia.....	118,517	167	389 00	2 43
Kentucky.....	166,453	129	384 00	2 28
Tennessee.....	166,650	125	376 00	3 00
Maine.....	64,309	102	343 00	3 36
Dakota.....	17,435	215	332 00	1 54
Florida.....	23,438	141	323 00	2 29

(Since writing this report the following article has been put in my hands and it is considered worthy of insertion here):

“GLORIOUS NEW JERSEY.

“A Pittsburgh paper having alluded slightly to the ‘sand-flats of Jersey,’ Rev. J. M. Buckley, editor of the *Christian Advocate*, who resides at Morristown, says in that paper: ‘Sand-flats of Jersey!’ Jersey, whose agricultural products are worth more to the acre than those of any other State in the Union! Jersey, whose cranberries, strawberries, peaches, pears, plums, blackberries and grapes make the mouths of the people of the two great cities of New York and Phila-

TABLE IV.—Continued.

STATISTICAL TABLE OF FARM CROPS AS REPORTED BY SECRETARIES OF THE COUNTY BOARDS.

COUNTIES.	BUCKWHEAT.			HAY.			POTATOES, WHITE.			POTATOES, SWEET.		
	Product compared with last year—per cent.	Average yield per acre—bushels.	Average price per bushel December 1st—cents.	Product compared with last year—per cent.	Average yield per acre—tons.	Average price per ton, prime, December 1st.	Product compared with last year—per cent.	Average yield per acre—barrels.	Price per barrel November 1st.	Product compared with last year—per cent.	Average yield per acre—barrels.	Price per barrel November 1st.
Atlantic				98	2	\$18 00	102	48	\$1 50	86	40	\$1 67
Burlington.....	*100			*75			*110			*80		
Camden.....	110			75	1½	15 00	110	60	1 50	80	70	1 25
Hunterdon.....	100	25	60	50	1	15 00	80	50	1 50	100	55	1 50
Mercer.....				60	1	14 00	90		1 20			
Middlesex.....	100	32½	67½	75	1	12 00	116	39	1 25			
Monmouth.....				57½	1½	13 40	98½	46¼	1 50	100	31	1 72½
Morris.....	90	20	55	50	1½	14 00	100	45	1 00	100		1 00
Ocean.....				73	1½	11 58	105	45	1 75			
Salem.....	110			85			50			50		
Somerset.....	108	22½	61	75	1½	13 00	100	45	1 05	90	45	1 45
Union.....	110	15	65	55	2½	14 65	80	54	1 36			
Warren.....	100	21	60	75	2	19 00	70	35	1 75			
				62	1½	15 09	97	50	1 20			
From U. S. Department of Agriculture Reports of 1891.....		14.2	67		1.05	14 40		Bushels, 98	Bushel, \$0 48		Bushels, 99	Bushel, \$0 50

* Comparison made with an average good year, at 100 per cent.

TABLE IV.—Continued.

STATISTICAL TABLE OF FARM CROPS AS REPORTED BY SECRETARIES OF THE COUNTY BOARDS.

COUNTIES.	APPLES.			PEARS.			PEACHES.			GRAPES.		
	Product compared with last year—per cent.	Average yield per acre—barrels.	Price per barrel, November 1st.	Product compared with last year—per cent.	Average yield per acre—barrels.	Price per barrel, November 1st.	Product compared with last year—per cent.	Average yield per acre—baskets.	Average price per basket for the season—cents.	Product compared with last year—per cent.	Average yield per acre—pounds.	Average price per pound for season—cents.
Atlantic.....	120	85	\$1 65	105	40	\$1 75	100	75	80	120	2,400	3
Burlington.....	*150			*200			*150			*125		
Camden.....	400	150	75	500	160	1 40	600	450	30	100	4,000	2
Hunterdon.....	150			125			150			100	6,000	3½
Mercer.....			1 00									
Middlesex.....	300	300	1 20	116	300	1 23	109	225	38	130		
Monmouth.....	215	175	1 35	235	140	1 65		300	40	150	4,000	3½
Morris.....	125		75	125		1 75	75		35	50	4,000	3½
Ocean.....	200		1 00	112		3 00	200		30			
Salem.....	*100		75	75		1 40						
Somerset.....	*150	85	88	*145	100	1 75	*115	375	25	100		
Union.....	150	40	1 42	200	40	2 37	155	200	36	108		3¾
Warren.....	350	50	1 00	250	35	2 00	125	150	40	110	3,000	3
From U. S. Department of Agriculture Reports for 1891.....	160		1 10	140		1 40	400		30	100		
	*100			*100						*90		

* Comparison made with an average good year, at 100 per cent.

TABLE IV.—Continued.

STATISTICAL TABLE OF FARM CROPS AS REPORTED BY SECRETARIES OF THE COUNTY BOARDS.

COUNTIES.	STRAWBERRIES.			RASPBERRIES.			BLACKBERRIES.			WATERMELONS.		
	Product compared with last year—per cent.	Average yield per acre—quarts.	Average price per quart for season—cents.	Product compared with last year—per cent.	Average yield per acre—quarts.	Average price per quart for season—cents.	Product compared with last year—per cent.	Average yield per acre—quarts.	Average price per quart for season—cents.	Product compared with last year—per cent.	Average yield per acre.	Average price per 100 for season.
Atlantic.....	80	3,200	6¼	85	1,500	8½	83	1,100	7	65		
Burlington.....	*90			*90			*90			*90		
Camden.....	90	2,500	6	90		15	90		3	90	6.0	\$7 00
Hunterdon.....	100		8	60		10	85		7	75		8 00
Mercer.....	58		6	90			82			50		
Middlesex.....	100	1,500	10	90	1,900	11	100	1,800	3	110	1,600	11 00
Monmouth.....	100	1,920	5	100	4,480	5	100	1,600	5			
Morris.....												
Ocean.....												
Salem.....	85	3,600	6	90						65		
Somerset.....	90	1,900	10		1,200	10	125	1,100		100		20 00
Union.....	130	2,000	9	110	1,200	12	120		7			
Warren.....	*103		9	90		8	100		6½	100		12 00

*Comparison made with an average good year, at 100 per cent.

TABLE IV.—Continued.

STATISTICAL TABLE OF FARM CROPS AS REPORTED BY SECRETARIES OF THE COUNTY BOARDS.

COUNTIES.	CITRON MELONS, OR CANTALOUPEs.			CUCUMBERS.			CABBAGES.			TOMATOES.†		
	Product compared with last year—per cent.	Average yield per acre— basket.	Average price per $\frac{1}{8}$ -bu- shel basket for season— cents.	Product compared with last year—per cent.	Average yield per acre— basket.	Average price per $\frac{1}{8}$ -bu- shel basket for season— cents.	Product compared with last year—per cent.	Average yield per acre— heads.	Average price per 100, November.	Product compared with last year—per cent.	Average yield per acre— tons.	Average price per $\frac{1}{8}$ -bu- shel basket—cents.
Atlantic.....	100			150	150	20	98		\$3 50	85		80
Burlington.....	*60			*100			*100			*100	*10	
Camden.....	60	250	10	100	250	30	100	4,200	1 75	100	8	15
Hunterdon.....	50			35			100	5,000	2 50	100	8	14½
Mercer.....												
Middlesex.....	75	200	37½	100	150	45	100	3,500		120	10	
Monmouth.....	50		20	100			100	6,000	3 00	100	8½	32½
Morris.....							100			100	10	
Ocean.....							100		8 00	100		10
Salem.....	50		20	95		25	95	3,250	3 00	80	8	20
Somerset.....							140		4 00	120		25
Union.....							125	5,000	3 00	120		10
Warren.....							116			125		20

* Comparison made with an average good year, at 100 per cent.

† In canning tomatoes, New Jersey leads. In the pack by States, in cases of two dozen tins each, New Jersey has 950,838 for the year 1891.—United States Department of Agriculture December Report.

TABLE IV.—Continued.

STATISTICAL TABLE OF FARM STOCK AS REPORTED BY SECRETARIES OF THE COUNTY BOARDS.

COUNTIES.	HORSES.				MULES.				COWS.			YOUNG CATTLE.	
	Total number compared with December 1st, 1890—per cent.	Average price between 1 and 3 years old.	Total number compared with December 1st, 1890—per cent.	Average price between 3 and 7 years old.	Total number compared with December 1st, 1890—per cent.	Average price between 1 and 3 years old.	Total number compared with December 1st, 1890—per cent.	Average price between 3 and 7 years old.	Total number compared with December 1st, 1890—per cent.	Average price between 3 and 7 years old.		Total number compared with December 1st, 1891—per cent.	Average price between 1 and 3 years old.
Atlantic	100	\$75 00	101	\$148 00	100	\$100 00	114	\$125 00	103	\$38 00		100	\$20 00
Burlington	100	100 00	100	125 00	100	75 00	100	150 00	110	40 00		100	20 00
Camden	100		100	150 00			100	150 00	110	40 00			
Hunterdon	110	60 00		120 00					100	30 00		100	18 00
Mercer	100	90 00	100	125 00	100	125 00	100	150 00	105	35 00		100	28 00
Middlesex	100	67 50	100	130 33	100	75 00	100	162 50	117	30 00		100	15 00
Monmouth	100	90 00	100	125 00	100		100	135 00	100	35 00		100	20 00
Morris	101	75 00	100	100 00	100		100	140 00	96	30 00		101	15 00
Ocean													
Salem	110	95 00	110	140 00	100	100 00	100	125 00	105	35 00		100	20 00
Somerset	102	91 00	100	130 00	100	100 00	105	152 00	106	34 00		100	18 00
Union	110			150 00	105			150 00	110	35 00			
Warren	100	70 00		125 00					98	38 00		97	18 00
From U. S. Department of Agriculture Report, January and February, 1892.....		Total number. 87,531	Average price. \$100 34	Total value. \$8,782,860		Total number. 8,465	Average price. \$113 76	Total value. \$962,987	Total number. 189,035	Average price. \$35 00	Total value. \$6,616,225	Total value other cattle. \$1,835,731	

TABLE IV.—Continued.

STATISTICAL TABLE OF FARM STOCK AS REPORTED BY SECRETARIES OF THE COUNTY BOARDS.

COUNTIES.	VEAL CALVES.		SHEEP.		LAMBS.		SWINE.		TURKEYS.		CHICKENS.		WINTER WHEAT.		WINTER RYE.	
	Total number compared with December 1st, 1891—per cent.	Average price per pound for season—cents.	Total number compared with December 1st last year—per cent.	Average price per head for store sheep.	Total number compared with last year—per cent.	Average price per head for spring lambs.	Total number compared with December 1st—per cent.	Average price per pound December—cents.	Total number compared with December 1st—per cent.	Average price per pound November and December—cents.	Total number compared with December 1st—per cent.	Average price per pound November and December—cents.	Area sown compared with last year—per cent.	Average condition December 1st.	Area sown compared with last year—per cent.	Average condition December 1st.
Atlantic.....	100	6					76	7	100	15	102	11	110	98	100	100
Burlington.....	100	6	100	\$5 00	100	\$6 00	100	51½	100	16	100	15	100	80	110	100
Camden.....	90	6	90				100	6	100			17	100	85	100	90
Hunterdon.....						4 50	110	6	100	15	100	13	100	100	100	110
Mercer.....	105		105	4 50	100	5 00	90	6	95	13		11	100	100	110	100
Middlesex.....		5¾		3 00	100	5 00	100	5¾	100	14		13	95	115	120	100
Monmouth.....	100	6	100	5 25	100	5 00	100	6¾	100	14	100	12½	100	100	100	100
Morris.....	90	6		4 25		4 50		6		16		14	90	100	105	100
Ocean.....																
Salem.....	100	5¾	90	5 00	90	5 25	95	5	75	16	100	15	100	95	100	90
Somerset.....	101	6	94	4 42	95	4 87	96	6	102	15	110	12½	104	107	107	101
Union.....										18	100	11	110		110	
Warren.....		5	120	5 00	100	4 25	90	5½	75	15	75		100	85	100	85
From U. S. Department of Agriculture Report, January and February, 1892..			Total number. 102,077	Total value. \$413,922			Total number. 190,547	Total value. \$1,758,746								

REPORT OF COMMITTEE ON COUNTY BOARD REPORTS.

To the President and Gentlemen of the State Board of Agriculture :

The duty assigned to your Committee on County Board Reports, increases rapidly in volume with each succeeding year ; this fact, although adding immensely to our labors, is, however, a matter of intense satisfaction to us all, because, based upon a correspondingly increased growth in interest by our people in the work of the State Board and its sub-branches, and their appreciation of our work ; advancing as they experience the direct results in material additions to their orchards and granaries, from the valuable practical lessons taught both in the County Boards and Institutes, and their parent Society, the State Board, proving that our labors are of incalculable advantage to our State on all the different subjects of practical agriculture and economics.

Your committee find plenary evidence from the different county reports that an increased State appropriation has so extended the operations of the State Board that no contribution by the taxpayer returns him so largely as that advanced to the State Board.

It has enabled the Secretary of this Board to devote his whole time to the duties of his office, to be present aiding and contributing to the efficiency of the County Boards ; to arrange for and provide talented speakers for the Farmers' Institutes held in so many of our counties, all of which are reported as successful and well attended ; and incidental hereto, your committee feel it due to the services rendered by Prof. E. B. Voorhees and Doctors Smith and Halsted, of the College at New Brunswick, to state that such is the value fixed upon them by our people that few meetings seem to have been held without their attendance being demanded.

COUNTY BOARDS.

Atlantic County held two meetings, Secretary Dye present at each ; addressed by Prof. Halstead on sweet potato rot, by Prof. J. B. Smith on insects, and Prof. Voorhees on farm chemistry ; and Dr. Boyeson, who reported testing, and that no possible harmful traces could be found in fruit sprayed with the Bordeaux mixture ; that land syndicates are here very active and useful in building up rapidly many localities, greatly adding to valuations ; swine decimated by cholera ; glanders threatened, but stayed by prompt action of the Board of Health ; a very large crop of grapes, making 100,000 gallons of wine ; cranberries an average crop, but crops generally large and satisfactory.

Thinks the cause of depression is too much for politics, not enough attention to agriculture.

Burlington County. This report is full and comprehensive, highly creditable to the Secretary, Henry I. Budd. Held very successful meetings of their County Board and Farmers' Institute ; attendance very large and showing decided increase ; reports crops very large and demand good ; cranberries were the largest crop they ever had, about 150,000 crates, averaging \$1.70 per crate.

Poultry for two years very profitable ; pork too low to pay, but they have great hopes founded on reciprocity.

Fruit crops exceeding any of the past fifty years ; 60,000 baskets of pears gathered in one orchard ; potato crop also large ; grain the same ; hay short from dry spring.

That for many years there were on the best farms three uniformly profitable crops, viz., sugar corn, watermelons and sweet potatoes.

Taxpayers complaining very strongly of the constantly-increasing tramp nuisance and the apparent raids on the county treasury by unscrupulous officials taking advantage of the Tramp act ; they ask relief.

They express their very high appreciation of the lectures given by Prof. Voorhees, on Farm Manures ; Prof. Halsted, on Potato Fungi ; Col. A. Pearson, of Bridgeton, on Spraying of Trees, Vines and Plants ; Linton Satterthwait, on The Farmer in Politics ; Dr. W. C. Parry, on The Savings by Organization, and Mr. J. M. Dalrymple, on Neglected Items of Farm Profits. They further suggest that some experiments tend to show that the Bordeaux mixture prevents rot

COUNTY BOARD REPORTS.

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and blight in potatoes, and summarize by saying that "unfavorable legislation annuls all their natural advantages." All labor is tending toward the town and factory. That the farmers are rapidly educating themselves on all economic and practical subjects through their organizations, which are very numerous and efficient in this county.

Cumberland County. The report from this county presents a very cheering prospect. The work which it is the duty of this Board to aid and advance, shows signs of splendid progress, and the county is being organized by the farmers meeting in every neighborhood and perfecting their Associations. They have an organized County Board, an Agricultural and Horticultural Society, projected a Farmers' Institute held for two days, which was well attended and very profitable. Secretary Dye superintended, and addresses were given by many prominent gentlemen.

The Alliance is reported very active, with a branch in nearly every neighborhood, and increasing very rapidly. They had a magnificent yield of nearly every crop, but prices very low, and farmers feeling the hard times worse than for many years past.

Constant decrease in amount of farm labor in both numbers, quality and morality. Wages, \$15 to \$20.

Spraying of fruits, &c., very highly regarded. Tomatoes, usually a great crop here, did poorly. Vines given too much nitrogen grew luxuriantly but fruited poorly; shrunk from an average of ten to three tons per acre.

Hunterdon County reports having held three County Board meetings and a two-days' Institute. Attendance very good, and a great increase over former years. That this county is being thoroughly organized; in addition to five Granges, with growing membership, they have added the past year one Farmers' County Alliance and fourteen Sub-Alliances.

The County Grange in October had a very creditable display of farm products.

The weather bulletin well circulated and appreciated.

The wheat and rye crop the largest they ever had. Corn better than usual; oats poor; hay short; potatoes short, but no rot. Apples, largest crop in ten years.

Middlesex County held five county meetings; a strong interest growing, and membership increasing. Very large yield in potatoes—one field of Rochester Rose yielding 300 bushels per acre. Hay one-half to three-fourths crop, with good prices. Very full crop of cabbage, bringing from \$3 to \$5 per hundred.

This county is being thoroughly organized by the farmers, five Sub-Alliances being formed the past year, with a rapidly-increasing membership.

Monmouth County held four regular and one special meeting, with a large number of speakers, including Professors Voorhees, J. B. Smith, Messrs. W. R. Ward, A. S. Lamberton, Frank Denise, J. H. Baird, Aaron Smock, L. G. Schenck, Hon. Mortimer Whitehead, National Lecturer of National Grange, and Hon. D. G. Fairchild, of Agricultural Grange Department, Washington, D. C.

That the spraying of fruit trees is not found to be always profitable as conducted, but promising; their general crops the most bountiful ever raised, and testify to the valuable aid they have received through the medium of State Board of Agriculture, and its manifest advantage to New Jersey's agricultural and all other interests.

Mercer County. This Board held five meetings, which were addressed by an array of prominent speakers, all well attended. They report land advancing near the cities, wages also increasing, being from \$15 to \$25 per month; makes special mention of her productive soils, fine markets and transportation facilities. There are four Granges and two agricultural organizations in the county auxiliary to the Board. That agricultural depression is produced by increasing taxes; too high an interest-rate, debt, scarcity of labor and high wages; neglect of home resources and lack of diversity in crops; but, as outranking all other causes, disregard by the farmers of organization and co-operation, a large percentage of leading farmers having no interest therein, to the manifest injury of their county, their neighbors and themselves.

Salem County. The agricultural organizations of this county bear a striking resemblance to her soil, both appearing in a first-class condition and highly productive. Agriculture is here not only thoroughly organized, but extensively so, her Board of Agriculture holding four

COUNTY BOARD REPORTS.

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meetings a year, with a large attendance; is the headquarters of the West Jersey Agricultural and Horticultural Society; has a splendid County Grange and three Sub-Granges, one County Farmers' Alliance and five Sub-Alliances.

On several occasions they secured the lecture efforts of Professors Voorhees and Halsted. In addition to the above meetings, a very successful and largely-attended Farmers' Institute was held at Woodstown, January 7th and 8th, 1892, conducted by the Secretary of the State Board. A programme of practical subjects was prepared, and the success of the Institute was largely due to the active part taken by the members in discussing the questions advanced.

Union County. The Union County Board is unusually active under the management of its energetic officers and members. They held eight meetings this year, and we think are entitled to the banner in this respect.

They also report the attendance of Secretary Dye, Prof. Voorhees and Mr. Benj. Sears, of the College Farm, and are arranging for a course of lectures, projected by Prof. Voorhees, on Practical Agriculture.

Sussex County reports holding one of the largest County Board meetings yet had, to hear address of ex-Gov. Hoard on 'The Dairy.

That corn averaged 20 per cent. over last year; wheat increased 10 per cent.; rye increased 10 per cent.; oats increased 20 per cent.; buckwheat, unusually good; hay, short; potatoes, good; apples, large crop; small fruits and vegetables, but little grown; sheep and swine-growing, decreasing; poultry has increased 25 per cent.

A steady decrease in the value of all farm lands; growing scarcity of tenants; higher terms offered, but they have gone into other business.

Farm labor becoming scarcer and difficult to get; cause, railroads and manufacturers are enabled to give better wages; farm wages average \$18 per month.

Increased interest in the road question.

Organization neglected and people indifferent. Is there any connection between this fact and the other, viz., decrease in land values?

Essex County reports an extraordinary year and a remunerative one. Growing interest in the study of agriculture. Milk is the main interest.

December 4th, held Institute. Great interest. Addressed by Benj. C. Sears, on Dairy Cattle; Secretary Dye, W. R. Ward, Prof. Halsted. A successful fair by Caldwell Grange. Increased interest in roads. Caldwell township appropriated \$10,000 for roads. Complain of tardy action of Passaic Commission on Drainage.

Camden County. This Board is well organized and supported by the leading agriculturists of this section.

Held two meetings last year and urged legislation to protect insectivorous birds and say the sparrow must go. Ask the establishment of free mail delivery to farmers. Were addressed by Prof. Voorhees, and his lecture highly commended; followed by Benj. C. Sears, on Dairy Cattle, which was deemed very instructive.

Road question strongly agitated; unanimously indorsed last winter's Road law.

Agriculture reported more prosperous by reason of better crops and prices, but a great scarcity of labor.

The spraying of fruits and vines found to be highly profitable and successful in every way.

Warren County is also showing great advances in the matter of organization, which is constantly increasing therein.

Have a first-class County Board, a Picnic Association, one County Alliance, six Sub-Alliances and two Granges.

Gloucester County. The report from this Board is very full, exhaustive and satisfactory, reflecting great credit upon the organization as well as upon their Secretary, who has given it much time and consideration.

They held four meetings last year. Their several programmes were excellently arranged and evoked much profitable discussion on a wide range of topics, economical and domestic.

Their Farmers' Institute, under the superintendence of Secretary Dye, was a great success, and they note the lecture of Prof. Voorhees at both County Board meetings and Institute. They send us a good suggestion regarding the dog-tax, *i. e.* in localities where the dog-tax

COUNTY BOARD REPORTS.

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is levied to pay sheep bills. In some sections the dogs have driven out the sheep—none to kill—hence no dog-tax, and dogs increasing in numbers. They report great benefits from the use of the spraying operations and other farm experiments.

We are in doubt as to whether any other county conducts these progressive features more intelligently than Gloucester.

Counties not referred to in the foregoing list failed to send reports in time.

THE DAIRY INTEREST OF THE STATE,

Representing a capital of \$50,000,000, of 185,328 cows, averaging \$34 each, has been greatly benefited by the invaluable tests and records made at the College Farm by Benjamin C. Sears, Esq., whose lectures, so freely and extensively given, have resulted in immense savings to this vast interest. Burlington, Hunterdon, Mercer, Salem and Union counties report a large increase of dairy cattle, a general improvement of stock and improved methods of feeding at less cost, as a result of the College Farm experiments and records.

Your committee think that Mr. Sears has well earned this special tribute.

The co-operation of 1,200 out of 1,500 milk dealers in Southern Jersey resulted in the saving of \$60,000, as collated and shown by Dr. Parry.

CANNING.

We think more attention should be given to the great canning industry, growing up so rapidly in our State that the item of tomatoes alone has already become the fourth crop in value in our State.

Of the canning works, Atlantic county reports six. Burlington county packed, this year, 3,000,000 cans; 1,000,000 cans packed at Mount Holly; one factory packing 100 tons of squashes. Hunterdon county reports successful establishments at Lambertville and Stockton, their acreage increasing, Lambertville putting up 540,000 cans and 1,000 barrels catsup. Mercer has two, one at Hightstown and another at Titusville. If any legislation, either State or National, can aid this great industry it should be urged and favored.

ROADS.

We find a very general agitation upon the subject of roads among all the organized counties.

Resolutions are before us from Burlington insisting, as the road tonnage exceeds that of the railroads, they strongly urge improvements and ask for State aid.

Hunterdon county reports new road law not well carried out, but approves if well obeyed.

In Mercer county there is a great interest and the new law is satisfactory, but asks that the road tax be expended where collected.

Middlesex demands the repeal of the law of 1891.

In Salem county an increased interest is manifested.

Warren county is also acting in the matter.

RESOLUTIONS.

Several are submitted to us.

Burlington county asks the abolition of the Board of Freeholders and the appointment of Commissioners.

Atlantic wants game laws amended and the killing of quail prohibited. Also to fine all persons who grow infected trees.

Warren county, to reduce interest to 5 per cent., and all salaries.

Your committee report that they find as the summary of the various reports, that it is shown that the farmer will soon learn to distinguish between those expenditures which bring him as large returns as any business investment ever projected, and those which only redound to the advantage of the recipient, and the senseless clamor for a "horizontal reduction," without regard to benefits returned or services rendered, may no longer be stated in the familiar words from "the Governor down," subjecting us all to ridicule and contempt.

SAMUEL FOWLER,

A. S. APPELGET,

Committee.

PRESIDENT'S ADDRESS.

Gentlemen of the State Board of Agriculture :

In compliance with the usual custom of those elected to the honorable and responsible position of President of the Board, it becomes incumbent upon me to present to you at this time as briefly as possible a statement of my observations and conclusions, and to offer you such suggestions as I deem of sufficient importance for your consideration. The report of the Executive Committee has given you a fair idea of the work that they have been engaged in since our last meeting. The report of the Secretary has shown you the extent of the field of his labors and the work he has in contemplation, and also given you many useful suggestions. I shall not attempt to review these reports, but earnestly recommend that you give the suggestions they contain your thoughtful consideration.

The year just closed has been a remarkably fruitful one ; in fact, the yield of fruits, both large and small, has entitled it to be classed as a phenomenal fruit season. The teachings of the Board as to the spraying of fruit trees have been more extensively followed than formerly, the effects of which, largely aided by natural causes, have so reduced the injurious insects that the fruit was unusually fine and fair, and in this respect was in marked contrast with the year 1890, which was a phenomenally barren year, so far as the fruit crop was concerned. One of the developments of the year has been to confirm the opinion, often expressed, that New Jersey is the home of the Keiffer pear, as the enormous crops on some orchards that I took occasion to visit warrant me in asserting. One orchard visited in Camden county contained 10,000 trees, and with very few exceptions they were all in bearing ; gentlemen whom I believe to be competent to judge estimated the yield to be $4\frac{1}{2}$ bushels per tree, on a total crop of 45,000 bushels, but owing to poor orcharding the trees were badly broken, and probably not more than 25,000 bushels were marketed. I also visited orchards in Burlington, Monmouth and Gloucester

counties, where the trees were equally fruitful, but under a better system of orcharding a much larger percentage of the crop was marketed. The question as to this pear being a crop that will be profitable in the future I leave for your own conclusions.

NATIONAL FLOWER.

I was gratified to hear that our State Horticultural Society had raised its voice in favor of a national flower, and all the more so to learn that their choice was the *Golden Rod*. This plant is indigenous to our soil, it is found in every section of our land, and delights in the neglected roadside, where its little golden plumes nod a friendly recognition to the stranger who, perchance, should pass along the highway. There is nothing obnoxious in this modest plant; it may be styled a weed, but it is not pestiferous, and it is easily eradicated. The tribute to this flower incidentally paid by President Harrison, at Brandon, Vermont, in October last, when he was showered with bouquets of flowers, caused him to remark:

"MY FELLOW-CITIZENS—The kindly pelting which I have received at the hands of some of your ladies and these bright children reminds me of a like experience on the California trip, when we were so pelted with bouquets of handsome flowers that we were very often compelled to retreat from the platform and take cover in the car. These gifts of flowers which you bring me here are the products of your fields and not of your garden. In the beautiful golden rod—it is pleasant to think that this plant is so widely distributed, slightly diversified in its characteristics, but spreading over nearly our whole country—we have a type of the diversity and yet the oneness of our people; and I am glad to think that its golden hue typifies the gladness and joy and prosperity that are over all our fields this happy year, and, I trust, in all your homes. I thank you for your pleasant greeting this morning, and bid you good-by." [Cheers.]

New Jersey has been chosen as the location of our summer capital; it is all the more worthy and proper for us to be among the first to cast a vote for our national flower, and I trust that you will indorse the action of the Horticultural Society in so doing.

EDUCATION.

It affords me much pleasure to be able to announce that the recommendation of the last meeting of the Board, relating to the intro-

PRESIDENT'S ADDRESS.

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duction of the study of agriculture in the public schools, is favorably thought of by our school authorities, and efforts will be made to carry out the wishes of the Board; but there seems to be two essential points to overcome, the one to have the teachers properly qualified to teach the studies desired, and the other a suitable text-book. The neglect of publishers of school-books to meet this demand is the result of the indifference hitherto paid to the subject. The increased energy of the Professor of Agriculture, in securing, through the medium of the State Agricultural College, a short course of study, embraced in a course of practical lectures, will eventually tend to arouse an appreciation of the study of agriculture, and cause the primary knowledge, taught in our public schools, to be a prerequisite to advanced studies. The absence of suitable text-books is, therefore, greatly to be deplored, and I would recommend that you instruct your Executive Committee to investigate the subject thoroughly, and, if unable to find suitable books, to employ a competent person or a commission to formulate and publish a book suitable for the proper inauguration of the study of scientific agriculture. In this connection I most heartily indorse the movement for University Extension, now under consideration by our Agricultural College, as affording the best opportunity for young men to become interested in the study.

TAXATION.

The subject of equalization of taxation that has so frequently engaged your attention, and the efforts put forth to secure a more efficient tax law, seem at last to be nearing a realization. That drafted and presented by the Tax Commission of a year ago failed to become a law, but in its stead there was enacted a law creating a Commission of Taxation, and clothing the Commissioners with certain powers and duties to enable them to inaugurate a reviewing system of assessments and an equalization of tax-rates and valuations. This law, although hurriedly drawn, seems to be the foundation upon which is to be built a system of valuations and assessments that will reduce the amount of exempted property to a minimum, and reach a vast amount of property that now entirely escapes the vigilance of the Assessors.

As an example of the operation of the equalization of valuations, I will instance a case that came under my personal observation. A

clause in the new law says "that property shall be assessed at its true value," and soon after the organization of the Board of Taxation last spring, they adopted and promulgated general rules for the guidance of Assessors as follows:

"First. All property must be assessed according to its true value.

"Second. Assessors must determine the true value of property from actual view, and from the best sources of information within their reach."

In accordance with the law of last session (see P. L. 1891, Chapter CXIV., page 189) and in obedience to the rules of the State Board, the Assessors of some of the townships in Camden county proceeded to assess the property in their respective townships approximately at its true value. And when the County Board of Assessors met they were surprised to learn that the law of 1891 and rules of the State Board had been ignored by most of the other taxing districts in the county, and notably so by the Assessors of the city of Camden, Gloucester City, the township of Stockton and the borough of Merchantville, which made the assessments so grossly unequal as to be onerous on the people paying taxes in the townships, especially so in Delaware, Haddon and Center townships. At the preliminary meeting of the State Board of Taxation, held at the court-house, the Assessor of Gloucester City candidly admitted that he assessed at a two-thirds value only. The Assessor from Merchantville also honestly admitted that he assessed at only one-third of true value. The Camden Assessors stated that their assessments were on a basis of eighty per cent., and that they had increased their rate twenty per cent. from last year, which was a sort of revelation, for by reference to the abstract of ratables, it would be found that the increase in 1890 was \$1,071,425, and in 1891 it was \$1,002,225, being about six per cent. less than the year previous. It was difficult to see where the twenty per cent. of increase came in. A petition setting forth the inequalities was presented to the State Tax Commissioners, and a hearing of the grievance was granted, and the case was argued pro and con, the cause of the petitioners was sustained, and judgment rendered in their favor, by which the sum of \$6,561.88 of State and county taxes was deducted from the three townships that were over-assessed and imposed upon the districts undervalued, thus equalizing the assessments and valuations. The action of the Commissioners in this mat-

ter marks a new era in the methods of assessing property, in this State, which, when fully understood, will be found of great value. The result has fully exemplified the wisdom of the creation of a State Board of Taxation, and that the principle of State supervision is a correct one. With intelligent and conscientious Commissioners clothed with the necessary powers, and a thoroughly devised system of rules, easily understood and explained, the equalization of the burdens of taxation will be solved. Prior to the creation of this tribunal it was impossible to secure speedy justice and relief from the action of the local Boards of Assessors. The present mode of hearing appeals is simple and inexpensive, the decisions are promptly given, and they will receive the general approval of the taxpayers. Before leaving this subject I would direct your attention to the vast amount of property now exempt from taxation, as classified and set out in the report of the State Board of Taxation, and which they estimate at \$75,000,000. Twenty million dollars is classed as church property; \$15,000,000 as school, college and other property used for educational purposes; \$11,000,000 as graveyards and cemeteries, and the balance is for property used for public purposes by the State or municipalities. The report of the Commissioners is well worth examination.

PORK QUESTION.

Some years ago a member of the Board from Burlington county presented a resolution asking the Board to use its influence to have the prohibition of Germany against American pork removed. The resolution was adopted by the Board, and there has not been an opportunity lost by your executive officers to urge the matter upon the proper authorities both by petition, memorials and personal solicitation. And it is with great satisfaction that I am enabled to announce that this long-desired object has at last been achieved, and under the Meat Inspection law American pork will again be admitted to Germany, Denmark, Italy, France, and many of the smaller countries of Europe. The export trade will no doubt be absorbed by that giant monopoly, the Dressed Beef Trust, and if prices are not advanced in the wholesale market, it is probable that there will be a more general demand and readier sales, which may serve in a measure to revive this great industry for which New Jersey became famous. A gentleman lately engaged in the provision business, with whom I had a

conversation recently relating to the pork industry, gave me the following calculations relating to the percentages of sides, hams and lard usually obtained from a hog in the ordinary practice of cutting and curing, viz.:

One hog weighing 216 pounds will cut as follows:

	Pounds.
2 Sides.....	74
2 Hams	31
2 Shoulders.....	36
2 Rumps.....	7
Lean.....	30
Head and bones.....	23
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One hundred hogs, weighing 21,600 pounds, produced the following:

	Pounds.
200 Hams	3,100
200 Shoulders.....	3,600
200 Rumps.....	700
Lean.....	3,000
Heads and bones.....	2,300
200 Sides.....	7,400
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	20,100
Loss.....	1,500

Actual percentage, 11,839 hogs, as follows:

	Pounds.	Per cent.
Loss from gross weight to net weight, 19 $\frac{1}{4}$.		
Shoulders	407,410	16.62
Hams	366,155	14.93
Clear rib sides.....	779,208	.....
Clear sides.....	21,958	42.92
Mess pork	253,428	.....
Rump pork.....	38,200	1.52
Lard.....	326,078	13.20
Loss from net to product.....	.....	10.71
		<hr/>
		100.00

From carefully-conducted experiments it has been ascertained that one bushel of corn will make about ten pounds of pork. Upon this basis, when corn sells at thirty-three cents per bushel, pork costs four cents per pound, and when corn sells at fifty cents per bushel pork costs five cents per pound. When corn is sold in the form of pork

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the farmer will realize about as follows: Pork at three cents per pound, twenty-five cents per bushel for corn; pork at four cents per pound, thirty-two cents per bushel for corn; pork at five cents per pound, forty-five cents per bushel for corn. The main source of profit, according to these figures, would be the manure, which is considered equivalent to the keeping of the hog. If this is taken into account, we can afford to make pork at the present low prices, but in no other way without loss.

MILK INSPECTION.

In 1880 the first law was passed relating to the inspection of milk. At the time of its passage I had the privilege of being a member of the Legislature, and in my argument against the passage of the bill I used the following language as near as I can recall it: "The consumers of milk are willing to pay, and do pay a fair price for it, and are entitled to and should receive a wholesome and pure article. But to secure such milk the inspection of herds, the feeding, care and cleanliness of the stables and surroundings, the milking and care of the milk while cooling and awaiting shipment, are the proper duties of an Inspector; that nine-tenths (and one-half of the other tenth) of the milk when it left the hands of the farmer was as pure as we had any right to expect. If the Inspector would also examine the depot and storage-places of dealers and their methods of handling milk, the officer might be of considerable benefit." These were my views in 1880, and I have not as yet seen any reason to change them.

I have referred to this matter because I am aware that in most of the cities and some of the large towns there are swill-milk dairies where the cows are kept in close, badly-ventilated and filthy stables, and fed on sloppy and impure food, and that the product of such dairies (if they should be so styled) is sold as pure, country milk, and comes in direct competition with the product of country dairies. I am informed that under the present law the Dairy Commissioner has no authority to inspect herds, and that the Board of Health can only abate them as a nuisance where complained of. If such is the true condition of affairs I think you will agree with me that some additional legislation should be secured to enable some authority to investigate, and; if necessary, abolish such methods of producing milk. In 1889 I called your attention to the "adulteration of food and drugs,

which has reached such proportions that there is scarcely an article of diet upon the market that is free from adulterated substances. Spices, confections, medicines, milk, butter, cheese and lard have been adulterated to such an extent that in some States and cities Inspectors are a necessity, and their labors highly appreciated. I am of the opinion that their inspection should be extended to meats as well. It is not to be denied that there are many animals slaughtered and the meat sold to customers when the flesh, if not diseased, is unwholesome. Animals too young, poor, half-fatted, maimed and diseased, many of which are only fit for the bone-boiling and fat-rendering establishments, are too frequently put upon the market and sold to members of the community who of all others should have wholesome food. The placing of such meats upon the market, and the large quantities of ready-dressed beef from distant parts, lessens the demand for better-fed animals and has practically driven the stock-feeding farmers out of the business in this State." This condition of affairs still exists. And the Legislature would make no mistake in clothing the Dairy Commissioner with power not only to inspect dairy herds, but also slaughter-yards and meat-markets, with power to condemn and consign to the bone-boiling establishments all animals or meat unfit for food.

MACHINERY AND NEW INVENTIONS.

The inventive genius of America is constantly making improvements, or adding new implements or machinery intended to save labor and reduce the cost of production; many of these implements are of great value, and should be brought before the practical farmer in such a manner as to fully demonstrate their usefulness and method of operating. Without attempting to enumerate them I will mention a few to bring the matter fairly before you. The improvement in harvesting machinery seems to be making rapid strides; we now have a low-down binder that binds the grain on the platform without elevating it; another that uses a grass rope that is said to be cheaper than twine and less wasteful. There are several new potato planters that will be on the market the coming season, besides improved dairy apparatus for aerating and cooling milk, and other appliances for the dairy. Steam-plowing by traction engines is also awaiting trial, and I believe that within five years they will be included in the outfit of every traction engine in the State, and I bid them welcome.

A few years ago it was thought impossible for grain to be threshed by steam-power, because the grain crops were too small to make it pay, but we find them to be so practicable that there is scarcely a horse-power to be had. Again, it was thought impossible for an engine to travel on our public roads, but they are here and they have come to stay. There is no reason that the man who does your threshing should not also do your plowing, and when you can get eight, ten or twelve acres plowed in a day for little more than the wages of the men you would employ to do it by horse-power, the gain in time and saving in horseflesh, with the advantages of getting a crop in at the proper season, will warrant the outlay. These plows are in service in the West, and I feel that they should be brought to the East, and I would suggest that the management of our Agricultural Societies consider this subject with a view to having a field trial of machinery early in the month of June, and exert themselves to secure a steam plow. If they do not feel capable of inaugurating this work I would recommend that you authorize your Executive Committee to investigate the subject, and, if practicable, to take action in the matter; they have the power under the law, but would feel freer to undertake the work if the Board would give expression of its sentiments regarding the venture.

FREE POSTAL DELIVERY.

In our efforts a few years ago to secure lower postage on plants, seeds, &c., I first became aware of the great advantage to farmers and suburban residents that would be afforded by a free mail delivery, and I was greatly pleased when the Postmaster-General announced that such a scheme was not only feasible, but profitable. Upon giving the matter still closer attention I am fully confirmed in our right to demand such facilities, not alone because they are delivered at public expense, and that one class of citizens have as much right to receive the benefit as another, but also because of the great saving of time to the masses, now rendered necessary by a daily trip to the post-office. Every farmer and rural resident needs a daily paper, beside other periodicals and journals, and if speedy and direct delivery of letters were made a certainty it would greatly facilitate their business relations, not only with their commission merchant, but in their intercourse with each other; and much time, expense and horseflesh

would be saved. Farmers and suburban residents are fast becoming the reading portions of our communities; being, to some extent, isolated from the social privileges of the cities, more time is occupied in reading. I have since the first of the present month forwarded subscriptions to the amount of \$65 for such periodicals as the *Century Magazine*, *Cosmopolitan*, *Review of Reviews*, *Harper's Bazar*, *Ladies' Home Journal*, *Godey's Lady's Book*, *Harper's Young People*, *Youth's Companion*, *Country Gentleman*, *Rural New Yorker*, *American Gardening and Household Magazine*; these being secured at club-rates include several copies of each, and at least two-thirds are for farmers' families, and the remainder for suburban readers. As this represents my own locality, it is safe to say that it reflects the general condition of affairs in the cultivated sections of the State. I, therefore, urge you to use your individual and organized efforts to secure the free delivery of mails by mounted letter-carriers. Another and very important service would be rendered the farmer by receiving early reports of the Weather Bureau, that would enable him to take advantage of the forecasts in time to be of some advantage to him. Nor would I have you stop there; these same mounted letter-carriers should be clothed with the power and duties of Constables, legally authorized to arrest trespassers and other depredators who infest the rural districts; they could also enforce the School laws, so far as to compel the attendance of school children of school age during school hours. I earnestly urge you to early action on these matters, and if they meet your approval, to act promptly and energetically in securing the needed legislation.

MORTGAGE AND DEBT-PAYING ASSOCIATIONS.

Another matter to which I have given much thought and consideration has been the devising of some practical method to enable farmers to relieve themselves of the burden of mortgage indebtedness. It is not so much the mere cash payment of interest-money that discourages so large a portion of land-owners, as the thought that after having worked hard for a home, and seemingly on a foundation to make a comfortable living, that in case of death, owing to the mortgage on values, the capital invested in purchasing the farm would be absorbed and nothing left for the wife and family; this feeling remains like an incubus on the minds of many an otherwise happy

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and contented home. With the present prices and an overcrowded market there is little hope of accumulating much toward reducing indebtedness, and I believe it necessary to devise some method of accumulating small savings so as to relieve this pressure on the mind, and eventually relieve the farm of indebtedness. I am aware that some have resorted to life insurance, but I shall venture to suggest what I believe to be in many respects a better and more practicable method, which is, to organize mortgage and debt-paying associations. Whenever a sufficient number of stockholders can be obtained, let there be organizations formed under our Building Association laws, and, generally speaking, on the same principle, only that while the building association encourages the going in debt for a home, let the dues be paid on the same principle as a building association, and the loans made only to pay off a mortgage, which should be assigned to the association under proper regulations as security for the loan, and when the series runs out have the mortgage canceled. I fully believe that the plan can be formulated and eventually will be, and that they can be and will become as successful as the building associations now are. And when hope takes the place of fear and discouragement, there will be comfort and energy in the household. I am aware that some of you will regard this suggestion as impracticable and unworthy of trial, but I ask that you give it a thorough consideration before condemning it.

POSSIBILITIES OF NEW JERSEY AGRICULTURE.

Last year I took occasion to call attention to the possibilities of the State, in what is known as the white sand region, in which I claimed that there was not an acre of the alleged waste-land known as "The Pines" that could not be made productive. The subsoil being clay, gravel and loam, needs only good cultivation to be made good and valuable crop-producing land. In this assertion I received many indorsements by citizens in different sections of the State, notably a letter from a gentleman in Burlington county, which was published in my address last year. This letter led to inquiries as to the location of these cheap lands, from parties desiring to colonize them. These inquiries led me to accept the invitation of Colonel Pearson, to assist him and make a further inspection of the agricultural possibilities of said lands. In company with Secretary Dye, I visited

Vineland just after the close of the strawberry season. We met a hearty welcome from the Colonel, and after inspecting his experiments with the Bordeaux mixture and copper sulphates on the grapes of his vineyard, we drove over to the Jewish settlement called Alliance, on the borders of Salem county. I am free to say that I was somewhat prejudiced against this class of immigrants, and determined to see for myself before encouraging any further colonization schemes from this class. As soon as I arrived at the settlement I was struck with the caste of the people, as well as the evidence of prosperity that presented itself on every hand. These people were styled Russian Jews, but there is evidently a large admixture of German blood in them, and I understand they speak both languages. The women have fair complexions, rather fine looking and good figures. The men are of good size, strongly built, with a somewhat German cast of countenance.

When these people first arrived on this tract they numbered sixty families, and were all sheltered in a large canvas tent until their land was assigned them, when they constructed slab-huts, some of which are still standing, and are used as fruit-houses and stables. These huts were in time supplanted with good four and six-room houses, painted in light colors, which are built along the highways, and are good, comfortable homes. Their farms contain about ten acres each, and cover a total area of about two square miles. The produce shipments of this settlement amount to such proportions that the railroad company has erected a large and substantial freight station solely for their accommodation, which, at the time of our visit, was too small for the fruit-crates that were there awaiting shipment or delivery. On inquiry, I was informed that most of these people now own their homes. They originally had but little knowledge of agriculture, but are beginning to learn how to use our plows and other implements, their chief reliance being the hoe. It struck me very forcibly that what this colony needed was somebody to instruct them in our methods of agriculture, to practice a rotation that would enable them to grow their corn and grass, and thus prevent the great expense of purchasing food for their horses and cows. There is no doubt as to their being able to do this, for the green grass by the roadside fully demonstrates the possibilities of the soil in this respect. The result of my visit was to remove my prejudice, and I am inclined to think there can be but little objection to *this* class of Russian Jews settling

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on these lands. I am informed by officers of building associations in Salem, that some of these people hold stock in those societies, and that they are among the most prompt in the payment of their dues. Throughout this settlement there seemed to be an air of happy thankfulness that they could enjoy the freedom and benefits of a government where despotism is not tolerated or known, and where they could rejoice in the ownership of their homes. That these people are contented and happy, there is but little doubt. What has been done for them seems to be appreciated. And what they have done for themselves others can do. Leaving this colony I was invited to visit a German settlement, considerably older, located about three miles farther south. Here I found a thoroughly-cultivated region with splendid vineyards, some of the most fruitful I had ever seen. Large and well-furnished residences with pleasant surroundings, and wine-houses costing from fifteen hundred to two thousand dollars, containing from sixty to seventy-five barrels of wine, fermented and unfermented. When I inquired as to the foundation of the settlement I was informed that most of the people I had spoken with walked from the railroad station and took up this land on suffrage, with no more earthly goods than they could carry with them, and in twenty years they have acquired these homes, many of which cannot be bought for \$100 an acre. With these facts before me I am free to say that I cannot estimate the possibilities of this region. I do not own a dollar's worth of land, nor have I any prospective interest in it or its owners; I have only given you the impressions of my visit as it occurred to me at the time, and I am fully prepared to indorse Col. Pearson's paper of last session on the "Possibilities of Southern New Jersey."

ROAD QUESTION.

There is probably no question in the State that is causing so much earnest thought as that of good roads. On this as well as the subject of taxation, the State Board of Agriculture has long borne a conspicuous part, and much valuable information on this subject will be found in its reports. The Commission appointed by this Board three or four years ago to examine the Road laws, after a great deal of labor and consultation, formulated a General Road law in accordance with the views expressed by a large majority of those in attendance at the

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meetings of the Board. This bill abolished the office of Overseer of the Highways and placed the care of the roads in charge of the Township Committee, and was presented at three meetings of the Legislature, but it did not become a law until last winter, when, through the assistance of His Excellency Governor Abbett, and the energy of Hon. Benjamin F. Tine, of Hunterdon, your Legislative Committee secured its passage, but at so late a date as to render it only partially operative in some sections of the State. The passage of this law I consider the first step in advance for a better system of road management, and where fairly tried it will be universally approved. It cannot be expected that the abolition of so many petty offices, numbering all the way from two to thirty in a township, would be accepted without some friction, nevertheless the law is all right; if there is a wrong it is in its management. You can now hold three men responsible.

The law extending State aid for the construction of public roads is the second step, and a long one, towards better roads. The same gentlemen who rendered such efficient aid in the passage of the first law were equally interested in the passage of this bill, and I congratulate you on the success of these measures. With the exception of slight amendments to the latter to make it effective, there should be no legislation to interfere with these laws until they have been fairly tried. So important do I regard the subject of road legislation, construction and maintenance, that I have encouraged the Secretary to call a convention of prominent gentlemen to confer with you on this subject, and I trust their deliberations and suggestions may prove of great benefit to the State.

BATTLE MONUMENT.

As a Jerseyman to the manner born I feel a just pride in the history of our State, and particularly of the deeds of the founders of our government. The battle of Trenton was the turning-point in the struggle for independence, and it is with pleasure that I can announce that through the energy of the people of the city of Trenton the government has been induced to erect a creditable monument to commemorate the victory achieved here. It cannot be denied but that the yeomanry of the State bore their full share in the struggle, and they should be allowed to bear a share of the honors pertaining to the erection of such monuments on our historic fields.

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CONCLUSION.

In conclusion I desire to say that during the eighteen years that I have been continuously connected with the State Board of Agriculture I have watched its growth from a dozen members in attendance at its meetings until it has reached its present proportions, with auxiliary organizations in nearly every county of the State. We have secured, by law, a permanent location in the State Capitol, and the Secretary and his clerk are kept so busy in attending to its duties that, in the near future, an assistant or additional clerk will be necessary. During all these years of its progress I have endeavored to keep a watchful eye upon the work done and its results. It has sometimes been a matter of doubt and uncertainty whether the State at large was receiving a compensating benefit for the time we have devoted to it, and the labor and money expended in our efforts to increase and stimulate the varied agricultural interests of the State. I have experienced seasons of encouragement and discouragement as to the result. In some sections of the State I have met men who have never attended their State or County Board meetings; who have learned the art of spraying fruit trees, mixing fertilizers in formulated proportions, practicing improved methods of applying manures and fertilizers, and also of cultivating and marketing farm products. I feel satisfied that we have not labored in vain when they told me they always read our reports and had learned to put confidence in them.

It is from these and many other evidences of greater or less importance than I am enabled to assert that there is no longer any doubt as to the success of the work done and to be done by the Board. I feel that I can say without hesitation that the State will be fully repaid for its outlay from year to year. To us the journey has been long and tedious from the small beginning, nineteen years ago, to the present, and justifies the efforts made. Your star is in the ascendant and its orbit is upward. See to it that nothing dims its brightness. Let us continue our labors for ourselves, our State and our fellow-men.

THE DAIRY TEMPERAMENT OF CATTLE.

The President—I take great pleasure in introducing to the State Board ex-Governor Hoard, of Wisconsin, who will now address you on “The Dairy Temperament of Cattle.”

ADDRESS OF EX-GOVERNOR W. D. HOARD.

MR. PRESIDENT AND GENTLEMEN—In presenting this question, I do not consider that I need, in a State like New Jersey, go into the question of the primary points of a good dairy cow. If I was out on the prairies of Nebraska, where the beef idea had run a free course, I might have to do a good deal of underbrush work, for it is a little difficult to get farmers to understand, and indeed to get many men other than the average farmer to understand that dairy qualities in a cow, like the trotting qualities in the horse, like the difference of scent in dogs, like the fighting qualities in gamecocks, like the running quality in horses—all are based upon absolute and definite principles of heredity. It is difficult to make the average farmer believe this, though he accepts it as regards the hog; he don't know of anything else on earth to put the hog to, except flesh; if he did, he would breed him for something else at once. [Laughter.] He would make a general-purpose hog of him, if he could. [Laughter.] Nature has assigned certain limits in this case, and he beats his wings against the cage of limitation, so far as the hog is concerned, and there is that much gained.

I once heard of a man who exhibited some very fine Berkshires in North Carolina, and this is the only instance I know of where there is any other use assigned to the hog. He noticed that the farmers at the fair were passing right by his nice plump Berkshires, and went over to look at some razor-back specimens of that State. He finally thought he would inquire the reason, and he said to one of

them: "Why do you run over to look at those hogs, and pay no attention to my hogs?" He replied: "You'uns haint got the kind o' hog we'uns wants; we'uns want a hog that'll outrun a nigger." [Laughter.] There is a case of natural selection. [Laughter.] If the hog could not outrun a nigger, the man didn't own him long. [Laughter.] This is the only instance I know of, of a general-purpose hog. [Laughter.]

I will say that it is very hard to convince the average farmer that the dairy qualities in cattle are just as specifically subject to the laws of heredity as are the qualities I mentioned in other animals. The average judgment with regard to dairy cattle is very low, so low that the average cow of New York, one of the oldest dairy States in the Union, with the largest number of cows devoted to dairy purposes—this State produces an average cow that only gives 3,000 pounds of milk a year. I determined some of these things for myself, and employed a gentleman by the name of Jennings to take a census of the cows in Ellisburg, the second township in dairy production in the State of New York. I had him take an accurate census of those cows, the only instance where an exhaustive and accurate census has been made, or where a definite study has been made, from the very foundation, concerning the cow and her relation to cost and profit in one of the political units of the country—a township. The study resulted in the statement that there were 5,417 cows. There were 356 dairymen in that township, and a close estimate was made of the actual cost of keeping a cow in that locality.

It was then found that the average production of those cows was \$4.51.8 each less than it cost to keep them. It was found that in that township there was a loss annually of nearly \$25,000 in the business of keeping cows. This is cited simply as an argument showing the low grade of intelligence upon this question. Now, these farmers were intelligent men; they maintained a lecture course in that township, and they invited men from various places, men of great ability, to deliver profound discussions on questions of a high intellectual order. But they had been in the dairy business for fifty years, and could not handle their cows at a profit. There is no use mincing matters—that is just the state of affairs—they had been going on for years, losing money all the time in their business. I believe that with the farmers of New Jersey, as in all other States, a more intelligent exercise of judgment concerning this animal is needed.

In the study of this question, which has occupied my time very intensely for the last thirty years, I was led to judgments and conclusions hardly in agreement with the general opinions of our farmers. I have had to uphold them, and to maintain them, but I have lived to see many of them demonstrated to be true. When, eighteen years ago, I commenced in Wisconsin to agitate dairy questions, the farmers in my own county had not been paying specific attention to the dairy cow; the average annual production, according to the United States census, was then only eighty-two pounds of butter per cow. I have lived to see an improved condition of affairs, and now the average annual production in that county—Jefferson—reaches nearly 200 pounds per cow. I have lived to see what was never known before in Wisconsin—hundreds of men whose cows produce an average of 300 pounds to 400 pounds of butter per cow. [Applause.] I have lived to hear these men acknowledge that to achieve this result they were obliged to commence a study of the principles of breeding and introduce specific dairy blood. Just so long as they are cursed with these general-purpose notions, just so long will they have no-purpose cows. The question of the dairy functions in cows, like the speed function in horses, the scent function in dogs, is very largely a matter of temperament. I wish to dwell for a little while on the specific lines of temperament, as we find them in cattle and in men. We have men of the phlegmatic temperament; these are of the flesh-forming type—with short, thick, pudgy fingers, short neck, large trunk and short limbs, as a rule. Disease may produce obesity in many men of different temperament, but you will find men of the phlegmatic temperament taking on a certain type or form. Men of a sanguine temperament quite usually have a certain color of hair. Those of my own kind, the bilious, nervous kind, inclined to dark complexion and dark hair, are, as a rule, vigorous. You cannot put any fat on such a man's bones; you might as well try to fatten a fan-mill by running oats through it. [Laughter.] This law of temperament is a wonderful law. You may think it is all theory, but it is not. The law of natural selection applies to temperament as much as anything else. Men select their vocation in life largely by force of temperament. Show me a violinist of any note, if you can find one on earth, who has short, pudgy, fat fingers. Such a man is of a decidedly phlegmatic temperament, and music could not possibly struggle through such a medium and get out into intelligent expres-

sion. You will find the musicians with long, thin, bony fingers, and almost invariably they are of a decidedly nervous temperament. Show me a skillful seamstress, a woman who is remarkably adept, and see if you will find her of a phlegmatic temperament; never, or rarely ever. This law, then, carries us back to three principles—first, temperament; temperament decides form, and form decides function. These are all solid principles. Temperament decides form, and form decides function. This applies to the mechanic as well as to every machine on earth, and man is a machine in his action; not spiritually nor morally nor intellectually, but when it comes to physical action. Consequently this idea of form is essential everywhere to the highest possible results. You take the trotting horse of to-day, and why does he have a sloping shoulder? When I have talked on the trotting horse before now, I have seen men look at me as if this were a revelation. Every trotting-horse breeder should avoid the vertical shoulder. Now, why does it slope backwards? Everyone familiar with trotting horses knows that the typical trotter has a shoulder with a decided slope backwards. Nature shapes the body for each function, and the shoulder must slope backwards to allow the fore feet to be easily thrown forward, for as you slope the shoulder so you cast the feet. Also, if the shoulder slopes forward you bind the neck, so the horse cannot breathe freely under great stress. Why is the rise of backbone of the trotting horse different than that of the draught horse? Why does the backbone of the trotting horse run high forward of the hip? If you never thought of this, study it. There is hardly an instance where the backbone of the trotting horse does not run high from the hip forward. The trotting horse is a machine for motion, pure and simple, and nothing else. Why does the man who checks his horse high act foolishly? He compels a downward arch to the backbone. Hold your head up and back and see if you are not compelled to hollow the back. Someday we may hope to have sufficient intelligence to train horses so that they will be educated as little colts to trot without the cruel check-rein. I am a lover of the trotting horse, and of all our domestic animals. I want to see God's best expression, and not man's worst. I do not like to see the check-rein used. Budd Doble has said, "the man who drives a check-rein not only checks the horse but checks his spirit, and outrages the horse." Of course some horses are so viciously educated that they must be checked. It is simply a question whether you check high and get

less speed, or check low and get run away with. [Laughter.] Education steps in here as well as in the training of all other animals—of dogs, for instance. The dog men have thus far been unable to produce any general-purpose dogs, except where no attention whatever has been paid to breeding, and there they have produced the cur, which is a general-purpose dog. [Laughter.] Such people or such dogs are of little good.

The study of heredity is one of great interest to the dog men, and they have been very wise in holding to certain principles. I have been a breeder of fox-hounds and of bird dogs; both are bred for scent, but scent of a totally different character. Take the fox-hound into the field and you will find him crossing a thousand bird tracks without knowing it, but the moment that fox-hound strikes a fox's track, instantly his head is lifted up, and he bays loud and deep—"I have found it! I have found it!" What? That for which he was bred to find—the scent of the fox. Take the bird dog out into the field and he may cross a thousand fox tracks and never know it, but the moment he strikes the scent of a bird track, just that moment you see every muscle stiffen, the nose dilating, and the face eager, with suspended forefoot, and the tail stiff as a kitchen poker. What do you see? It is the five hundred years of breeding for specific purpose, the last expression, the last answer given to it, the final product of intelligent breeding for a specific purpose. There is not a man in New Jersey who would go out to hunt foxes with a bird dog, nor to hunt birds with a fox-hound. Not a boy in the State would do it either, for you can't fool a boy [laughter], but you can often find his daddy hunting for butter with a beef animal. [Laughter.] These are not the days of old mechanical agriculture; these are the days of close competition—close competition in dairy work just as in trotting horses. Gentleman, the man who wins to-day in dairying is in fast company. [Laughter.] We sometimes hear of the butter belt, and one might suppose it was formerly some peculiar, invisible, non-descript territory of New York, which claimed to own the most of it. It was thought that only along the Atlantic coast could fine butter be produced, and yet to-day I am producing it in Wisconsin, and supplying New York families, and the cow drops \$26,000,000 annually into Wisconsin's pockets. It is a positive fact that the dairy belt is not half so important as the dairy brain [laughter], for the dairy brain will make its own belt. What we need is more study

and thought on the dairy question. I have myself given a good many years of study to this question, and know less about it now than I used to think I did.

I have said to you that the dairy cow is the result of a specific temperament. You have on this canvas two pictures, one giving you a very clear exposition of the phlegmatic or flesh-forming temperament, and the other a specimen of the dairy cow. Here the Holstein, there the Jersey cow, and here the Jersey bull, Stoke Pogis 5th, and here is a Guernsey cow. [Mr. Hoard used a series of life-size crayon sketches of noted cows for the illustration of his lecture, and made reference thereto.] I want you to notice carefully the lines of temperament shown there in the Jersey, the gentle expression and the graceful contour. Note also the perfect agreement of these lines between the Jersey and the Guernsey. Just as the lines of the pointer and the fox-hound agree in temperament, the same agreement of body and shape for speed, and of the nose for power of scent. The function of running has produced a general agreement in the shape of the body.

Here is a cow that has been bred for one of the solids of milk (the Jersey), while here is one bred for the production of quantity largely (the Holstein). She has had wonderfully succulent pastures in her native land, where the grasses have abounded in juices, and has been bred for a constant enlargement in the direction of quantity. The Jersey and Guernsey cow was bred where the food was more condensed, and, as a consequence, she has reduced the quantity and enlarged the proportion of solids, but the general agreement in the lines of the head and body is the same. Now, the dairy temperament is shown most clearly in the nervous outlines of form and action. Do not misunderstand me; I speak of the nervous system, and have been very much misunderstood when I brought out this theory in 1886. I had to do battle with hundreds of men before I got them to understand what I meant by the word "nervous." I used it in a physiological sense; the word "nervous" indicates "full of nervous force, strong, stable, steady." The meaning of the word, as used by many people, would be better expressed by the word "nerveless," meaning "unstable, loss of judgment, suspension of intelligence, under fear, excitement." Now, many people who can be made unstable and excitable belong to the nervous temperament class, but the really strong person of nerve rarely becomes excited. They have courage and intelligence. The

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dairy temperament is based upon the nervous system. I want to call your attention to the Hereford cow here; does she look excitable? Do you not see in her a very strong preponderance of the flesh-forming temperament? It has nearly eliminated the udder. Mark the difference between her flank and that of the Jersey. In the Jersey we have the high-arching flank and the walls are thin, making provisions for a large mammary gland. The Hereford is of the phlegmatic type; she has the regular Poland China ham; that of the Jersey is opposite in form. The Jersey has the retreating ham, and is built in keeping with this one great idea—an active udder. The Hereford is built in keeping with the flesh-forming idea, so you will notice from this, if we are breeding for success in either direction, we must have a distinct and specific purpose. The more we breed beef *in*, the more we breed milk *out*. There are plenty of farmers who believe they can breed milk and flesh together to the largest profit in each; they have an idea they can load their guns to hit it if it is a deer and to miss if it is a cow. [Laughter.] You can't breed large, flesh-forming bull calves for steers and large milk-producing heifers with any profitable certainty; you waste the heifer if you breed for the steer. [Laughter.] A large milk-forming tendency has large nervous activity; this is based on the brain. If you don't believe this ask your mother or your wife. My wife has taught me more than all other sources on earth. Ask your wife what effect nervous excitement will have on all maternal functions and she will tell you that they are almost entirely within control of it. I will spend a little time in describing a good cow. She should have a large nostril, and why? Because milk is evolved from the blood, and the blood is vitalized by the air the cow breathes. She must have a large muzzle, for she must be a good feeder. She must have a full, prominent eye, because this indicates strong nervous force and activity. She must have a large nervous force to be expended in milk-production. She should be long from the eye to the top of the poll, because this indicates a large brain. The backbone should come up strong against the head. The backbone is one of the most essential things in the study of the dairy cow. The jointure of the backbone to the head should be strong, and if there is a falling away there, avoid that cow. The spinal marrow is but the continuation of the brain, and it is important that strength and power, in this particular, be well indicated. The backbone should be rugged, show

large processes, and very heavy. A good cow will, as a rule, show larger spinal processes than an ox, and this is an important requisite of a good dairy cow. When Prof. Robertson visited Denmark he saw there the skeletons of some of the most famous cows that country had ever produced. The first time he heard me talk on this matter of the backbone he was quite skeptical, but when he examined the skeletons he saw the force of the statement. The spinal marrow is a continuation of the brain, and it should be large and full, as a channel for the passage of large nervous energy.

At the Minneapolis State Fair I judged the Holstein cow, Tritomia, whose spinal processes extended fully an inch above the shoulder blades. There were 308 Holsteins alone at this fair, and there were forty-eight cows in the class of the particular cow I have reference to. I gave her the first premium, for she fully satisfied me as being the best cow. At once a murmur arose from the crowd, and they said I did not understand my business, for there were many others much handsomer. I replied that I was judging for talent, for capacity as a dairy cow, and these men were clear in the background, for they thought I was judging for beauty. My motto was "Handsome is as handsome does." I said, "I will stake my reputation that this cow is the best Holstein cow here." I would not go any further than this, and two days later the test proved her the best cow of any breed on the ground. Then they came and asked me what I saw in the cow. I answered I could not tell in words exactly. I have been a violinist, and my pupils have asked me to describe a tone. I would make a certain tone, and they would ask me how I did it, to describe it, but it was impossible. You can't describe the difference in scent between a rose and a lily, but I will try to tell you as near as I can how I judged this cow to be the best. In the first place, the backbone, as I have described, which is so important—I study it more and more every year—for thereon hangs the dairy law and the gospel. The dairy cow should have a neck indicative of femininity and motherhood—of maternity. We base the whole question on this. You make merchandise of maternity in the dairy cow. Now, the Hereford has muscle, and she keeps everything she gets. [Laughter.] She holds on to it and never gives it up until she is led to the block. She endows her progeny with the same quality, but the dairy cow is a benefactor, and takes large quantities of food, and by the large exercise of her maternity and nervous force, she gives you large results in

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milk and butter. The dairy cow should have the feminine expression; the dewlap should be retreating; the Hereford has a full bosom. The neck should be feminine and indicate her adaptability to maternity; the shoulder blades should be thin, and the pitch of the ribs should be entirely different from those of the beef cow; in the beef cow they branch out from the backbone almost at right angles, while in the dairy cow the ribs leave the backbone more like rafters of a house; you will note that the shape of the two is entirely different. The space between the ribs of the dairy cow is wider, and the rib is not of the same shape. It is inclined to be flatter and wider. In the dairy cow you have an open expression, of relaxation; in the beef cow the expression of closeness of build. Passing along we come to the pelvic arch—and here let me say that the old Shorthorn idea has cursed the judgment of thousands of men with regard to the back. You will hear men saying they want a cow with a straight back, and where do they get that notion from? why, from the old Shorthorn, beefy idea of the cow, which meant beef, the same as in the Hereford. This is a mistake; you want her to have the form best adapted to maternity. You must have a strong tendency in build and character for maintaining the work of maternity. The great purpose of this animal is maternity, and here you have the maternal form. In the Jersey you see a decided rise in the pelvic arch, which you do not see in the Hereford. This rise in the pelvic arch is a good sign, and is indicative of maternal strength and activity. It is also indicative that she will not deteriorate, and that she is not turning the forces of her body into flesh. Give this cow large feeding of grain, and even although it be fattening, she will turn it into milk, while the Hereford will turn it into flesh. It is curious about these laws of assimilation; on the one side of a bale of hay we have the sheep, on another the goat, on another the cow, on another the horse, and they all partake of the same character of food, and behold the transmutation of this food into the different products of these animals. It is a wonderful thing, when you come to think of it, but unless you have the proper temperament you will not get what you are feeding for. No man can afford to feed for twenty-five-cent butter and get three-cent beef. These dairy economics we have just been studying are beginning to strike men in the face and show where we have lost millions of dollars through lack of sound judgment.

Now, continuing on the points of the good dairy cow, as you pass your fingers down the hip you come to what may be called the division between the muscles on the edge of the hip or rump. In a cow of the dairy temperament you can put your fingers nearly between the muscles, showing they are not cross-tied and solid, but that the muscles are in a straight line. In examining the Hereford you will find they are knitted together in a solid mass, and you can hardly get your fingers between them. In testing for the dairy temperament, this is one very good sign.

Now, we come to the udder—this one great purpose of the dairy cow—the whole purpose of her existence, and to which she is tributary. A good udder should rise high behind and extend well forward in front. The line along the udder from the front to the highest point behind is the line of absorption against the body, and is very indicative of the power of the udder over the cow. The teats should be squarely placed, and this you can largely govern, yourselves, in breeding. Always examine the teats of the sire and see if they are squarely and widely placed, or if they are placed closely and narrowly. Peaked bags in cows—it is wonderful how they trace to close teats in the sires. I have been following it out in between 1,500 and 2,000 tests on these lines, and I advise you, when you breed, to find a sire with teats widely placed. The man who bred the bull Stoke Pogis 5th was the wisest breeder the dairy world has ever known. He bred for square udders and got them. He started right, for he started with the bull, and he did a certain amount of inbreeding. Inbreeding is like a razor, it will cut your throat or your beard with equal willingness and facility, depending upon how you hold it. [Laughter.] That animal is one of the most wonderfully inbred animals; note the coarseness of hair. No animals were ever inbred as were Dauncey's, yet we all have a horror of inbreeding. We must not have a horror of electricity because we have been struck by lightning. Look at the Jew. He is the most thoroughly inbred animal we know of. [Laughter.] You may cross a Jew with a female of any nation on earth and the product will be a Jew. [Laughter.] Inbreeding gives potency, prepotency, impressibility, power, modification of the stream it unites with. Let me illustrate by the Mississippi and Missouri rivers. They come together, the Mississippi's water clear, as it runs down between the States of Minnesota and Wisconsin; here comes the tumultuous Missouri, strikes the current of the Mississippi, and rushes

clear across to the other bank, and it is the Missouri from that time on to the sea. This is prepotency. This is the power you seek in the sire. Now, how will you get it? Not by dividing and scattering this line of heredity, making hash of it, but by strengthening it, enlarging it, by keeping it in the straight line. Native cows are made of hash in heredity—a little from everywhere. Here is a prepotent sire—it may be a Jersey, a Guernsey or Holstein—he unites with the native cow and he marks the progeny, and you have a half-bred Jersey, Guernsey or Holstein. If you want to raise a strong herd of dairy cows from a thoroughbred sire, let me suggest the following plan: Take any ordinary herd of cows, and in two generations, with thorough selection and good feeding, you can make 300-pound cows. I have seen my acquaintance do it by the dozen in Wisconsin. Take a herd of native cows yielding 150 pounds to the cow. Select a strong, prepotent Jersey, or dairy bull of any breed. There will be a few heifers you will doubtless wish to reject; select only the strongest types in constitution, and breed back again to their father. You then get an inbred three-quarter product; you have turned the stream of blood back again and enlarged it upon itself, and the result is you have a strong, prepotent cow. After that, inbreed no more. I know a man, a neighbor of mine, who has a herd of Jersey cows three-quarter inbred, who furnishes milk to my own creamery, and we paid him last year \$63 per head for the milk of 35 cows, and returned him \$12 worth of skimmed milk, making \$75 per head besides the calves, and besides his own living.

Twelve years ago this same man started with a herd of grade Shorthorns, yielding not over 150 pounds of butter per head. You see he had increased the dairy temperament until his herd produced over 300 pounds per cow last year.

I said select heifers of the strongest constitution, and I wish to say a few words on this. We have what I think are such strange ideas about constitution in dairy cattle. We hear men saying they want cows that are hardy; now, when you once know the meaning of "hardy," as they use it, you will find that they want cows that will endure neglect. I had my face to the car window from Paterson over to Deckertown, and I saw where men were making milk for the New York market, men whose destiny hangs on a profit on their milk, with cotton-seed at \$30, linseed at \$28, hay \$12 to \$15, and cows turned out at 9 o'clock in the morning, and not taken in until

4 o'clock in the afternoon, on a wet, cold, stormy, bad day, trying to warm all outdoors with costly feed, and make money. [Laughter.] They want hardy cows, to endure neglect. Why can't we get a clearer idea of dairy constitution? John L. Sullivan will stand up and take a pounding, and beat me a dozen times at it, because he has more constitution for pounding than I have [laughter], but I can kill John L. Sullivan sitting down in a chair at my desk. His constitution is different from mine, but I have just as much of it as he has. We must learn to understand the meaning of a specific dairy constitution; that the functions of motherhood have certain limitations we must obey; if we do not we may get a constitution of a kind we do not want, but we won't get the motherhood. Neither can the cow put fat in her milk and at the same time use it in her body. If you keep her exposed where she is not warm she must consume the fat in her body, and cannot possibly put it in her milk. The cow is like certain women—if you want to make them love you, first fill them up with love for themselves, and then what runs over belongs to you. [Laughter.]

Cows should not be exposed to cold, for you cannot afford to keep them warm on twenty-five-cent butter. [Laughter.] You cannot afford to feed the cow for butter and then have it consumed in keeping her body warm. The dairy constitution is that quality—and I want you to follow this closely—it is that quality which is within the function of its work—the ability to endure large strains in milk-giving, and not in exposure, not in your neglect, not in your foolishness. You have no business to expect a cow to show constitution to endure your neglect and foolishness. That don't belong to a dairy cow's constitution; you should amend her environment with your intelligence, by giving her warmth and comfort.

Now, what is the best sign of constitution? First, the general make-up of the cow. Her lungs and heart are, of course, indicative of her constitution, but listen to me; I may challenge many a man right here, perhaps, in what I am about to state. Without a single exception it is true, what I am about to state, in over 3,000 studies I have made on the subject, the navel is the best evidence of constitution you have. While in the army as a soldier I saw a surgeon rejecting a man he had examined; the man was of a splendid build, with strong limbs and of splendid size—the man stood there naked before us—and I asked the doctor why he rejected him. He said he

had no constitution, and I remarked he looked as if he had the best of constitutions; he replied he had not, and I asked where was the evidence; he said, "Right here on the abdomen; here is a never-failing sign of constitution. Notice this man; he has no endurance, for strength and size do not give endurance; you have seen little men beside you outmarch and kill big men; this man lacks vitality; the navel is a never-failing sign of constitution." I have found this a fact in my studies of cows. The snowbird can outlast an elephant from the tropics by his endurance. Vitality, endurance, ability to sustain itself—this is the proper definition of constitution. The ability to sustain itself within the *line of its own specific work*. It is just so with us. It is just so with the trotting horse; put him in with a draught horse and he will soon kill himself. It is not in the line of the work for which he is designed by build and breeding. Constitution cannot be fed into a man or animal, neither can it be trained into them. It can be fortified only by feeding and training. And this is the reason why—the vitality is given by the mother to the offspring. The foetus is supported through the umbilical cord. The Yorkshire fighters understood this when they said a fighter was "nae gude; 'e 'ad nae belly." The strong belly is the one; if you want to fortify this idea ask an accomplished accoucheur if he had ever been able to raise a baby successfully when born with a spindling and weak umbilical cord, and he will say he has not. Ask him if he had any difficulty in raising a baby when the umbilicus was short and thick, and full of vitality, full of foetal circulation, obliging him, at times, to leave an infant for half an hour, perhaps, before cutting the cord. He will tell you he never has any difficulty with that sort. The mother may even be weakly, but the constitution is in the child. If the umbilicus is small and weak the child cannot have constitution. The navel development is, therefore, the best indication of vitality and endurance we have. It does not indicate talent, nor does it indicate capacity in a cow, but it does indicate the ability to endure the work of capacity. When you look for constitution look under the cow's belly and examine the walls of the abdomen. If they are reinforced strongly towards the navel it is a good indication. The horse and the dog are much alike in the umbilicus. They are different from the cow. The other day a gentleman brought me two foxhounds, about a year old, and asked my judgment. One was a bitch, the other a dog—brother and sister. I said I thought the bitch was

not quite as sharp-scented or talented as the dog, but that she would run all day. After examining the dog I told him he would not run two hours. He smiled and asked me if I had seen them run. I said I had not, and he told me I was right; the dog had one of the sharpest of noses, but could not run. He asked me how I knew. I turned the dog over and showed him the thin, papery quality of his abdomen around the umbilicus, and said the dog was born without vitality, though he had lived so far by sufferance. The bitch was from the same litter, but she had a strong abdomen. He said I was right as to the facts. I think I have stated this idea so you will see it, gentlemen. In your selections, the animals you most require must have individual excellence, but you must be clear in your judgments as well as to the value of clear lines of dairy heredity.

Now, how to handle the dairy cow. I answer by saying, handle her as you would a mother. Take that one particular idea with you, and I will guarantee that when you once see the "how," your own wit will bring you the "why." The function of milk-giving requires warmth. Riding with my wife twenty-four years ago, with our youngest baby, she was taken with a sudden chill. She said, "I am sorry I have this chill." I was then studying in this line very ardently, and I inquired of her why she was sorry, and she replied, "It means less for the baby; any man should know that." Ah, yes; any man should know that! [Laughter.] My curiosity was instantly aroused. I was instantly attracted to what she said. "It means less for the baby," and why? Why is it that every chill, as she says, "means less for the baby?"

"What will you do to restore this function?" I asked my wife. She said, "I will seek warmth, and will drink warm drinks. Any man ought to know that." Oh, yes! [Laughter.] "There is one man trying to know it," I said. At that, I went to studying on it, and brought it out about the first, I think. I made some experiments in feeding warm water to cows, noting the effect. Then I brought out the idea of giving warm water, and supposed I had a great thing, but I soon found that every old mother in the land understood it already [laughter], but men don't understand it, if you judge by their actions. O! If we could inject a little femininity into their stupid masculinity it would be better for the cows. [Laughter.] A writer in Holland says that the cattle there are reared by the

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women of the land ; just so with the cattle of Jersey—the women of Guernsey reared those cattle. Show me a successful dairy cow that women have not had a good deal to do with. [Applause.] The maternal function in the cow requires particular care and kindness, so that the lacteal flow will be advanced and not hindered.

I spoke, a few moments ago, on depending only on milk for money-making—for milk means money. This matter of letting the cows ramble the fields for two or three hours every day, for the sake of securing exercise ; I would rather exercise a little more intelligence, and a little less cow. [Laughter.] I would rather study the law that governs motherhood a little more, and less that which governs mere notion. [Laughter.] I had rather go to-day into a section where men never knew anything about dairying than go where men have inherited a lot of old-fashioned notions, without any regard to facts and physiological laws. I can *in-form* ten men easier than I can *re-form* one man. [Laughter.] As the Hoosier says, “Their eyes is sot.” [Laughter.] You can’t reform such men—you can’t stir them up ; but I see some boys before me. You boys must learn to use a trained judgment, and act from a broader and more humane standpoint, if you hope to make a profit out of dairying.

A word or two concerning feed. The dairy cow should be fed properly, as well as bred and handled specifically, with regard to her health and comfort. Feed with an understanding of what you are doing. If she gives you a pound of butter she gives you also as much caseine ; what is it ? Almost pure nitrogen. You must feed nitrogenous food if you would support the nervous system. You must give a food that will keep this up—cotton-seed meal, bran, peas, linseed meal and clover. All these are valuable feeds for the dairy cow. But there is one point I want to make with you—stop buying this kind of food and see if you cannot produce it on your own farms. Do the best with what you have, if you want to make any money in the dairy business. We have been trying a different line in Wisconsin, and are growing one of the best foods on earth, and that is peas. We can grow them successfully there, and I see no reason why you should not be able to do as well in New Jersey. Pea meal is worth as much as linseed meal, nearly, and it has a peculiar effect on the butter-production of a cow. Let me give you a little calculation : Take twenty-five bushels of peas to the acre, a fair crop, and you

have the equivalent of \$33.75 worth of bran. That is a pretty fair return to the acre, is it not? Two pounds of pea meal, as a butter food for cows, are worth, by actual experiment, six pounds of ordinary bran, so that I find that 1,500 pounds of pea meal, or twenty-five bushels of peas, are worth 4,500 pounds of bran, and, at \$15 a ton, this is worth \$33.75. Besides this, you have the advantage of the pea fodder, and the advantage of a most excellent effect upon the soil. Study the dairy cow from her standpoint, and the pea from its standpoint, but do not make the common mistake with the pea—that of planting too shallow. It is a deep-rooting plant, and requires deep planting; thousands have not succeeded with the pea, because they have not considered that point. They must be planted from four to six inches deep, if you would succeed with them. Many of our farmers sow them so shallow that when a rain comes their bones whiten the field. [Laughter.] Try this plan and let me know about it. Use the Canadian field pea, or the Marrowfat pea. The Canadian field pea should be sown two and a half to three bushels to the acre, and the Marrowfat three to three and a half bushels to the acre. Select a piece of fallow ground, plowing it on purpose in the fall—ground which is dry the earliest in the spring. Harrow it well and sow the peas on broadcast, and then plow them under about four inches deep. Harrow the ground well before sowing. When this is done harrow the top of the ground again, and sow a bushel of oats. By sowing deeply and early you secure a growth before the heated term, and the pea-vine will not dry out before it fruits. By sowing thickly you hold the vines together, and the oats hold them up. Then, if the vines do fall, they fall in one direction, as a rule, and will not be badly twisted. Now, when you are ready to gather them, take your mowing machine and cut against the grain; have a boy fork them away from behind the machine, so you will not drive over them; then drive back and cut again the same way, and in this way you cut them very economically. Thresh them and grind them, and feed two pounds of pea meal instead of six pounds of bran, and you will not only have a very valuable feed, but a valuable fertilizer as well—you will have one of the finest dairy foods on earth, and you will say “Blessed be the day I adopted the pea-vine, for I have greatly reduced the cost of dairy farming.” [Laughter.]

Mr. Betts—In the department of scientific feeding there has been considerable asserted regarding the possibility of obliterating the

advantages of these dairy breeds you speak of by a proper knowledge as to feeding. I have seen, in several agricultural papers of high reputation, within the last six weeks, statements that a successful feeder could take the common cows you speak of and get out of them all that has been obtained by breeding for generations. How much truth is there in that?

Gov. Hoard—Jay-Eye-See trots a mile in 2:10 on twelve quarts of oats. I know of horses you might feed ten tons of oats and they could not trot a mile in ten minutes. [Applause and laughter.]

First, you must have the animal—you must have the dairy capacity; this, I believe, is the true theory with regard to this question. Every cow is born with a certain limit of proportion in her solids—the butter fat, caseine, albumen, milk-sugar, &c.—and I believe that every cow is born with a limit of proportion in these solids, beyond which she cannot go. I do not believe that one cow in a hundred has ever reached that limit, and why? Because her environment has not brought her to it, and when she has her proper care, feed and environment, she will increase her butter fat. Her owner does not look after the caseine. When she does increase her solids her owner says, "Behold what a wonderful thing feed is!" [Laughter.] Suppose a cow has a four per cent. limit of butter fats, three and one-half per cent. of caseine, 4.70 of milk-sugar, and 0.45 of albumen. Suppose these are her maximum limits of proportion, she may have been going all her lifetime and not have given over three per cent. of butter fats. A man takes her and feeds her well, and gives her intelligent handling, and as a result of this she comes up to her limit of four per cent.; she stops at that limit, no matter what she is fed, and the feed then either passes off undigested or it goes into fat in her body, but she can never be induced to go beyond that limit. Princess 2d made twenty-seven pounds of butter in seven days; Mary Ann St. Lambert made thirty-six pounds of butter in seven days. I had a little Guernsey who made sixteen pounds of butter in seven days, and a Jersey who never made over ten pounds. I also have a thoroughbred Jersey, and eleven pounds of her milk have made one pound of butter, but I fed her to her limit, I think, and have never seen her exceed it; this shows the difference in cows. You can increase the butter fat in cows only according to the limitations and the character of the cow, the same as you increase the speed in trotting horses, and no more.

Judge Forsythe—What about ensilage?

Gov. Hoard—In my own town are forty-five silos, and in the town adjoining there are sixty-five. Those who have no silos are beginning to build them, and those who have them are talking of enlarging those they already have. This is the most practical answer I can give you. I am somewhat surprised to find so little of this silo food used in the East. You are too conservative here, even to the extent of dying in your tracks. [Laughter.] You need to study this question more than we, because we produce food so much cheaper than you do. The silo is one of the most blessed things that have ever come to the farmer, for the production of either milk or flesh. Last year I saw the handsomest drove of steers I ever saw, turned out in May for the Chicago market, fed largely on ensilage, finished as perfectly as ever I saw cattle finished on June pastures, and the owner told me he never made beef so cheaply before. He said, "I have solved the problem of the economical production of beef, and can produce it cheaper than any man on a ranch." I believe it, and I believe we can make milk the same way.

Mr. Lippincott—What was the ensilage made of?

Gov. Hoard—Of corn; but peas or clover also answer very well. We have a little system we are beginning to follow out our way; at the last cultivation of our corn we sow rye in the corn, and that comes up nicely after a light cultivation, and gives us late pasture, and also gives us about ten days' pasture in the spring before anything else is fit to pasture. Then we plow it under, and plant in the regular rotation.

Judge Forsythe—What kind of corn do you plant?

Gov. Hoard—We plant largely of what is known as the eight and ten-rowed Dent; this is a hard corn, which takes from ninety to one hundred days to mature.

I want to give you an instance showing the effect of nervous agitation on the elimination of butter fats from the milk of the cow. If men only saw and understood this more they would handle their cows very carefully. As it is, too many of them are handled stupidly, but, thank God, there is a judgment to come [laughter], and the cow gets even, sooner or later. An old fellow in Wisconsin once said that the principal factors in farming were nitrogen, phosphoric acid, potash and stupidity. [Laughter.] No animal ever gets so nearly even with the stupid man as the cow; she simply shuts up. [Laughter.] While making this study of the nervous theory I wished to

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see what effect a sudden hurt would have upon the percentage of butter fats in milk. I had a beautiful little Jersey cow, a great favorite—a perfect little lover, for she would follow me all about the yard for a caress—a perfect female [laughter], if I have ever seen one in my life. I was milking her, and was just about half-way through, and took a sample of her milk and set it one side. I then did something I was always sorry for afterwards—I took a pin and gave her a sudden rake with it across the flank. She sprang into her stall and almost bellowed with fright; then she moaned and looked around at me—I do not use the stanchions—but I petted her, and she was certain it was not me [laughter]; she knew I would not do such a thing, but she could not tell what it was. Finally I quieted her down, and resumed milking her, and I then took another sample of her milk. I then had a chemical analysis made of both samples, and found just 15 per cent. less butter fat in the second sample than in the first; that much fat had gone somewhere on account of the fright given her. Now, gentlemen, I submit this fact to you—the marvelous influence of the nervous action on butter fats in milk.

I want to illustrate this by showing you the course of action of milk fever. Milk fever is a nervous disease; I am satisfied of that from the fact that it follows nervous channels straight through. Around this great mammary gland, and encircling it, is that wonderful network of nerves called the sympathetic plexus, passing thence to the uterus and thence to the spine and the brain. You see how the mammary organs, the genital organs, and the brain are tied together. You know how any derangement of the organs of maternity induces insanity in women; you see how these are tied solidly together, more than anything else in the functional arrangement of animal economy. Milk fever also ensues, if at all, within three or four days after calving, and milk fever in the cow is the same as that in woman. I believe the disease starts from a chill, and whenever this chill ensues, from any cause whatsoever, this disease often follows, and goes steadily on through this sympathetic plexus until it reaches the spinal marrow. The moment that spinal marrow is reached paralysis ensues and the cow drops. The cow begins to show signs of mental disturbance and insanity before this, and she beats her head and plunges about, and by-and-by swings her head to one side and dies, the victim of her motherhood, perhaps, but in nine times out of ten

the victim of stupidity. I have never seen the disease cured, but I have prevented hundreds of case. I lost one fine cow from the fact that the rules I had laid down were violated. I was at that time in the Executive chair, and my son telegraphed me, "Bonny Bell has a beautiful calf." I dropped the State of Wisconsin at once [laughter], and I went home instantly, and asked where is the cow? They told me she was down in the pasture, and my heart sank at once. I said, "You have not allowed that cow to calve down there, have you?" It was about four o'clock in the afternoon. I asked, "Was she out of doors when she calved?" Oh, yes. It was in the latter part of May; she was out of doors when she calved and had been allowed to stay out. We went to her, and she was lying down with the calf by her side, and when I got within twenty rods of her I said, "She is a dead cow." My son laughed at me—boys often think the old man don't know anything, you know. He said, "Why, father, you have such notions." "I suppose I have," I said, "but they have cost me something." I said, "Step off twenty feet from the cow, and I will show you whether she will have milk fever—take up the calf and carry it off twenty feet." I knew that the first effect of milk fever was a shortened range of vision. He took up the calf and stepped off twenty feet and the cow commenced to turn round and look for her calf. I worked with her all the afternoon, and all night, and the next day she died. Had I been at home I would have done this: First—she was in good flesh, but she was neglected—I would have seen that her bowels were relaxed. About a week before she was due to calve I would have put her in a box-stall, and have had her curried as regularly as possible—and right here I want to tell you the value of the curry-comb. When you buy a strange cow and bring her home she will be homesick, and you will often lose a portion of her milk. Let the man who is to milk her curry her once or twice a day, and she will say, "I have made something by the swap." [Laughter.] It is one of the best things in the world to relieve the cow of that sense of homesickness, of lonesomeness. I would commence to curry her at once, as by that means she is made more contented in the stall; this I also do before calving. Thus I can control her mental conditions. I would guard her against a chill, and see that she is not nervously excited. She is given plenty of water and a little food, but only as much as is easily digested; I give here oatmeal in warm water—all she wants. She is

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thirsty and feverish, and needs moisture, and plenty of it. I handle her in that way, and I never had a single case of milk fever before. It is a terrible disease. It takes away our wives as well as our cows, with equal virulence, and brings sadness to many a household, on account of disregard of the laws that govern maternity.

Judge Forsythe—What is the general cause of abortion in cows?

Gov. Hoard—The best thing I have ever read on this subject was by Prof. Nocard, of France—the first man who ever made an exhaustive study of it. He found that epidemic abortion was caused by a germ of infection; that it is found in the bowels of the foetus, and in the lining of the placenta. He got so far with it as to determine that it is an enzoötic disease, and infectious. The remedy has not yet been discovered, but much is known that will help prevent it. I believe that the infection is carried by the male; that service to an aborting cow is almost universally productive of abortion in the same herd of cows. Have any of you had a corresponding experience?

Mr. McBride—There is no doubt of it.

Gov. Hoard—If you have a case you will notice the cow will appear uneasy, if you are a close observer of your cows, as you ought to be, and she will throw off a discharge of a sort of pinkish color, and that will precede the abortion. This is highly infectious; indeed, everything about her is infectious. She must be kept alone; not for her sake, but for sake of the others. Don't use a male that has had service with an aborted cow. Abortion has two effects—it produces barrenness even in cows that never have aborted; for instance, she fails to get in calf, and barrenness is produced thereby. I had a Jersey cow I paid \$100 for, and I could not get her in calf because she came from an aborted herd. I was glad of it, too, when I found it out. I can give no remedy for it, but I think sulphur is a very excellent thing to feed cows, and it will prevent abortion to a certain extent.

Mr. Betts—How about bone-dust?

Gov. Hoard—Bone-dust does not kill the germ, whereas sulphur may. Sulphur will kill the itch, and I know that. [Laughter.] It is a germicide. I can remember when my mother stood me up by the fire-place, and I can see some of these old fellows here who show signs of intelligence on that question. [Laughter.] The itch is simply a germ, and sulphur taken and sulphur used is destructive of such germ-life. It must be used with care, but I have used it in my own herd, in the feed, two or three times a week. I give a dose of

about a tablespoonful in the feed. I used the flour sulphur. With this disease of abortion in your herds you will have to work pretty lively to get rid of it. Mr. Boyd claims to have stopped it by the use of the vaginal syringe, with a mild solution of corrosive sublimate.

Mr. Anderson—I know of a farm where the herd had this disease, and every cow brought on that farm now will have abortion. Nineteen or twenty cows have had dead calves there. It seems to be left on the ground and in the pastures.

Gov. Hoard—I think that is the case in many instances.

Mr. Ege—We have had the pleasure of listening to one of the most intensely-interesting addresses ever given before this Board, and I therefore move a rising vote of thanks to ex-Governor Hoard for his entertaining and instructive address.

Mr. Betts—I believe we are all most profoundly thankful for the convincing truths given us by Mr. Hoard. More than that, I think the speaker has convinced us all of his theories by what he has shown us of his own experience on this subject, and I therefore heartily concur in the motion of Mr. Ege.

Mr. Crane—I am in favor of this vote of thanks to the speaker, but we have some spare time yet, and he has been a perfect bonanza to us [laughter], and I think we had better question him a little more while we have the chance. I think we had better defer the vote until we get through.

The Secretary—The Governor is not physically strong this morning and may perhaps wish to be excused.

The rising vote was unanimously extended Governor Hoard.

The Chair—I take great pleasure, Governor, in extending you the unanimous vote of this Board for your exceedingly interesting and instructive address.

Gov. Hoard—I thank you, gentlemen, for your appreciation.

The Secretary—We have here three packages of "Hoard's Dairyman," one of the best publications in the United States. They will be here for free distribution, for any one wanting a copy, if you have not already subscribed for it.

Mr. Evans—I would like to ask the Governor for points on the choice of a male animal. I have no doubt you are full of good ideas on that subject. I believe it is a matter very little understood.

Gov. Hoard—The question, as I understand it, is about the choice

of a dairy sire. First, select a dairy breed; you have four dairy breeds before you, and also have modifications of breeds. There are certain Shorthorns, it is claimed; I know of but few; they are so bred up for beef that I would say select one of the four specific breeds you like best. Now select a bull of potency, and how will you determine that? First, with constitution, and I have given you some ideas how to determine that; then, on potency, how to determine that. Select a bull of a very determined spirit; don't be afraid of an ugly bull. Never select a dull-spirited bull and expect him to breed positively. Almost every noted Jersey cow on earth is the product of a high-tempered sire. We will know more when we become more intelligent, one of these days. [Laughter.] We will then see the deep significance of things we have not seen. The horsemen know this. You never saw a racehorseman who did not do all he could to prevent the breaking down of the spirit of the running stallion. They will endure everything so the spirit shall not be broken. That is one reason why I am opposed to dehorning. I would not dehorn an animal if I cared anything about him, for I am certain someday this business will return to plague us, in a way we will be sorry for.

I have had two severe fights in my life with ugly bulls. I once saw a Mexican lead an enraged bull around by the eyelid; a good thing if you can get hold of his eyelid. [Laughter.] It is a very sensitive spot. A bull once got me into a corner, and I got between his horns; his horns struck the boards each side of me; I reached down and turned out his eye, and he at once became intelligent on this question. [Laughter.] But I would not have been where I was if I had been intelligent in the first place. My father asked me to drive him back; he was in the entry. My father says, "Drive the bull back." He could not turn round, and he never did back out, so it must be a fight, and we had it out right there. [Laughter.]

I have said, select a bull of strong temper, strong purpose, where you wish that bull to make his mark. His mentality must be strong. Handle him skillfully; put him on the tread-power and make him work. Bulls have never been trained, and the bull of to-day is a good deal like much of the Christianity of to-day—an unexpressed quantity. [Laughter.] You are certain it is there, but you don't know what it is capable of. Now, the bull needs training and discipline, and discipline will do wonders. I have seen men in the army stand solid before a charge when every man among them was a

coward, and I among the rest. [Laughter] Discipline did it. The bull needs discipline and training, and then you can utilize him.

You want to make a reformation of one thing in your fairs in New Jersey. Don't give any more blind premiums to sires of any kind, but establish a breeding premium, and have it go to sires who are on the ground with four or five of their get. No man can tell whether a bull is going to breed rightly without you see his get, and I have been a judge at these fairs. You can guess at it, but you can't tell. The bull is there, and the purpose of him is breeding, but you can tell nothing without you see his get. You want to give a large premium, a leading premium, for every bull, and every stallion, and every ram, and every boar, and that should be a premium for the best get, and then your fair will be a source of education to your people—and it is not now.

Let me make one suggestion more. When the State Fair is held, and a stallion is brought into the ring, have printed cards, such as are used by the Maine Board of Agriculture, and have this stallion judged by points. You can get these cards printed by the million with advertisements on the back; then have a blackboard, and on it place a facsimile of the score-card. Now, when the judges have come to an agreement as to the points, they place on the blackboard the marks given, and then the people can copy these points on their cards and can go and see how a first-premium animal is judged. Who knows by the present method how he got his first premium? Who can tell why a boar or stallion, a bull or ram, gets the first premium? I have had eager men chase me over the fair grounds time after time, anxious to know; they touched my heart, they were so anxious to know how the judgment was reached. The agricultural authorities should adopt means by which any one can find out how these judgments are arrived at. This is a simple proposition, and it will be of immense advantage. Any man can take his score-card and can see that the shoulder has so many points, for instance, and take it with him home, or go down and look over the animal and gain some intelligence as to the points marked, and how marked.

Mr. Anderson—I would like to ask the Governor in regard to testing for butter fats—in regard to feeding for butter fats. He says there is a limit beyond which no cow can go, and that not one in a hundred ever reaches that limit. Take, for instance, an average dairy, giving twenty pounds of milk per cow each day and feed something

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like cotton-seed meal or cake meal, in addition to what has been fed, and if that will produce twenty-five pounds of milk a day, what effect will it have on the quality of the milk? Will it hold the quality or reduce it on an average herd of native cows?

Gov. Hoard—I will have to state that question myself. Take average milk, made up of the average of the individuals—I spoke of individuals when I said we could not get it up. Here there are a variety of causes at work. Intelligent handling increases the butter fats; saving from exposure to the weather increases the butter fats; intelligent feeding does it, too. If possible, feed her so as to carry her right up to her capacity. She should have large capacity, and we should carry her right up to it. The effect of good feeding will be to increase the butter fats, and to avoid the decrease of them. This is one of the most important things. Butter fats slide up and down as no other of the milk solids do. I have 260 patrons in four creameries, and about 120 in two cheese factories. My son and I handle these establishments; he more than I, for that is his department. We commenced last April to apportion the dividends in the creameries, according to the Babcock test. I want to say right here that never has there come such a gospel as this Babcock test; our old system of co-operative dairying was a kindergarten for petit larceny. [Laughter.] Now we have got on a square business principle and I will show you the result. Last November I stepped up to the creamery office and drew off a list of the amounts of butter fats contained in our milk. I was going to Iowa, and I wanted to show the folks there these facts. I will show you what the Babcock test did: The average for four years for April was 3.98 per cent. of butter fats to every hundred pounds of milk. The moment we commenced to divide by the Babcock test it jumped to 4.41. In May the average for four years was 3.82 against 4.7 in 1891; in June, 3.77 against 4.12 in 1891; in July, 3.94 against 4.22; in August, 4.19 against 4.43; in September, 4.36 against 4.59; in October, 4.62 against 4.91, showing an average monthly gain in 1891 for these months, over the four years previous, of 29 $\frac{1}{4}$ pounds, or nearly a third of a pound of butter in every hundred pounds of milk. Insurance companies talk about the moral hazard, and there is always moral hazard in every business. Talking about the Babcock test, an old fellow said: "That Babcock test can beat the Bible in making people honest." [Laughter.] I have tried both. [Laughter.] It

makes a man honest to his neighbor, and it makes the man honest towards the cow and honest towards himself; it makes him feel like shouting, "What shall I do to be saved?" and he begins to place the dairy business in the line of intelligence, and the result is we are doing what I never saw the like of before. Men are coming into my office, who have been railers on this question before, and ask me what about feeding and what about breeding, and what about this and that. They see something ahead of them. The Babcock test is simply this: We take 17.6 centimeters of milk in a small bottle shaped for that purpose, a certain number of centimeters of sulphuric acid and turn it into the milk; this is a metric portion of 100 pounds of milk; this is then put into a little whirler, and whirled about a thousand revolutions; the bottle has a little neck to it, and the whirler separates the fat from the caseine and leaves the fat on top. A little hot water is turned into it, and the fat comes up into the neck of the bottle, where it is measured in tenths by a scale on it, and you find in 17.6 centimeters of milk you have so many tenths of butter fat; that indicates the per cent. of butter fats in every 100 pounds of milk. If a man brings me 100 pounds of milk with four per cent. of fats, all right, or if only two per cent., all right, he gets just that much to his credit, and no more, no less. If he waters his milk he waters himself, and he don't water his neighbor at all, as by the old co-operative process. The system is delightful, and the effect upon the intelligence of the people in grand. [Laughter.]

Mr. Denise—Do you regard the Babcock as one of the most feasible and most accurate tests?

Gov. Hoard—It is absolutely correct, if correctly handled.

Mr. Denise—Can it be used by the average farmer?

Gov. Hoard—Plenty of farmers' boys use it. They go around testing cows for so much a head. One boy of sixteen years tests any number of cows for five cents a head. And now they are beginning to cut the boy down, too. [Laughter.] The milk can be tested at any time. Dr. Babcock, the inventor, is the Dairy Chemist of the Station in Wisconsin. It has been adopted all over the world, and the other day he received a very fine indorsement from Germany. It is a chemical test united with a mechanical test.

Mr. Denise—You do not use the cattle stanchions, I understood you to say?

Gov. Hoard—No, sir.

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Mr. Denise—Why not?

Gov. Hoard—Because they are more for the comfort of the owner than of the cow, and the owner don't give milk. [Laughter.]

Mr. Gillingham—You spoke of selecting cows. In our section we are obliged to make these selections while they are quite young. How can you make a selection while so young?

Gov. Hoard—That is hard. I never was smart enough yet to do it. There are a good many limitations here. I never could even guess very well how good a cow a calf would make until she was eight months old.

Mr. Gillingham—What are the best points to consider.

Gov. Hoard—Ancestry.

Mr. Denise—Can you tell after they are eight months old?

Gov. Hoard—Better then than before. She then begins to show a little udder. There is an indication of the coming udder after she is eight months old. Ancestry is worth more than anything else as a guide at this time.

Mr. Lippincott—What do you know of the Guinon system?

Gov. Hoard—I have never been able to tell anything about it. I have heard a great deal said of it, but I am not a smart enough man to make anything out of it.

Mr. Fisher—What is the variation of butter fats in your creamery?

Gov. Hoard—Our dividend for October was \$1.28 on an average. The lowest was \$1.10, and the highest \$1.61. That puts it in dollars and cents. One herd brought milk worth \$1.61, and another was worth only \$1.10, a difference of 51 cents per hundred pounds. We had a great deal of difficulty in starting a certain number of our patrons. There are always a set of kickers, you know. [Laughter.] They objected so strongly that we laid this scheme before them: We had two vats, one called the Jersey vat, into which we put all milk having 50 per cent. Jersey blood—for we could never have gotten the Jersey herds unless we had done this. Finally we said, "Here is a system of absolute fairness. All you kickers who don't want your milk tested, we will pool together, and all those who want theirs tested we will pool in a separate vat. Thus, you who don't want your milk tested can pool your milk as you did the old way." We will have two vats, one the test vat, the other the pool vat, and all those who are suspicious of each other will be put in the pool vat,

and all men who are willing to be judged by the deeds done in the body shall go in the test vat. It would have amused you to have seen those men balked out of that vat. [Laughter.] They didn't want to pool with one another, and so the argument was quickly turned on them—they didn't believe in their own honesty. [Laughter.]

Judge Forsythe—Do you think the fungus on corn can produce abortion?

Gov. Hoard—I think not. I don't know that it does, and I don't find anybody that does know.

Mr. Crane—Are your herd of Guernsey stock?

Gov. Hoard—Yes, sir; I have a small herd of this breed.

THE PRODUCTION OF BEEF, PORK AND MUTTON IN NEW JERSEY FOR MARKET—DOES IT PAY?

President Burrough—The next business on our programme will be an address on “The production of beef, mutton and pork in New Jersey for market—does it pay?” by Hon. John Taylor.

It gives me great pleasure to introduce Mr. Taylor to the State Board.

ADDRESS OF EX-SENATOR JOHN TAYLOR.

Mr. President and Gentlemen of the State Board of Agriculture:

This query is best answered by the fact that in all the grazing and feeding counties of our State the industry has declined, and farmers are not given to relinquishing anything that pays. There are a few stockmen who have survived the changed conditions and will tell us they still see a profit in some branch of the industry. But such farmers—farmers who can make money these days in feeding stock—are, as a rule, well armed with capital, experience and business sagacity, and do not represent the general average engaged in the business when the decline commenced twenty years ago; it's the survival of the fittest.

In the few minutes allotted to the consideration of this subject, let us see what is the matter with the business and how best to handle what is left to us. We will first talk about feeding cattle, as this branch has perhaps suffered greatest. The feeder says “Chicago beef has so cheapened prices as to ruin the business, and besides there is no market any more.” That's a wrong impression altogether. Chicago beef has had nothing whatever to do with reducing the value of cattle at the seaboard or anywhere else. If all the Western refrigerators in New Jersey, New York and Pennsylvania were to

close to-morrow, and remain closed, it would not affect the price for more than a week or two; for the fact remains that there is no saving in cost by shipping the beef dressed. It costs \$3.24 to ship a 1,200-pound steer from Chicago to Trenton. Slaughter him in Chicago and he will make about 675 pounds of beef, the freight on which would be \$3.03, and when you add ice charges and about 2½ per cent. shrinkage in weight *en route*, there is no essential difference between shipping live or dressed.

But you ask, Why should it cost as much to ship 675 pounds dressed as 1,200 pounds alive? There are several reasons ascribed. First, a refrigerator car weighs about twice as much as an open stock car, aside from two or three tons of ice, on which no freight is charged. Again, a refrigerator car must be hauled back empty at the expense of the railroad company, while a large percentage of stock cars go back loaded with coke, ores and other heavy, rough materials. These seem as sufficient business reasons why the rates on cattle should be 40 per cent. less per 100 than on dressed beef. But other considerations have helped to maintain this ratio of difference. One is, the railroad or high officers of the roads own the extensive stock-yards between Chicago and the seaboard. These yards yield immense profits, and to give the dressed-beef men any advantage would soon render them unprofitable. Further, any discrimination in favor of dressed beef would of course injure the important cattle industry of Pennsylvania, Ohio, Kentucky, Indiana and West Virginia, all of which territory turns to the seaboard for a market, and is tributary to the trunk lines. Hence, it is obvious that the great carrying roads will maintain an equilibrium between the dressed-beef and cattle interests, and the impression abroad that the Western dressed beef has ruined the Eastern cattle business must be dropped. The causes may be very briefly summed up. The comparatively high prices ruling a few years ago attracted an enormous amount of capital for the prosecution of business in the territories primarily. What were not showered on the market in grass-fed condition were spread over the corn-producing States of the West. The consequence has been that the production has outstripped consumption. Free pastures, extensive ranching and cheap transportation have been factors. What of the situation in New Jersey? Of course breeding cattle for beef purposes is not to be thought of. A good, thrifty two-year-old steer, weighing a thousand pounds in empty stock con-

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dition, would cost this fall about \$35.00 laid down on your farm. This represents about \$1.33 per month for each month of his existence. You could not produce him for that. He is the product of virgin soil bedded with nutritious grasses that are not yearning for fertilization at \$40.00 per ton. But that particular steer or load of steers may have come from York State or Ohio, yet if he did, it was the ranch steer that fixed his cost to you; or he may have come from Canada, in which case the Canada farmer, after parting with him in Buffalo and paying \$10.00 duty, has about \$20.00 left, and he rides home in the seat alongside the York State cattle raiser, who has \$30.00 for his steer of the same weight, and they discuss the question whether or not the tariff is a tax and who pays it. Now that you have a car-load of thousand-pound steers costing you \$35.00 each, what are your chances for profit in feeding? You have made your purchase in October after the flies are troublesome; you have a fine range of fall pasture; you graze them, if conditions are favorable, until December, when you take them up and stall them, giving them the same care as you would a favorite horse, keeping the stalls clean, well bedded and the cattle well groomed; keep this up say until the middle of April and you will have fed in meal and bran the equivalent of forty bushels of corn and fifteen hundred pounds of mixed hay to each steer and put on an average of four hundred pounds to each animal. This estimate is based on a series of experiments to which I have had access, and is concurred in by Mr. William Walton, of this county, who buys twenty-five to thirty feeding cattle in Buffalo every fall, and feeds them until April or May. Mr. Walton finds it profitable, and would not think of relinquishing it. With April or May your cattle are finished up and ready for market. They have cost you about \$64.00 each, reckoning corn at fifty cents at home and clover hay at \$12.00. Your cattle should scale at least 1,400 pounds at market, and if smooth should class as exporters, and almost surely fetch six cents, or say \$84.00 each; in fact such cattle are worth it now, and May is likely to see them higher. So what did you get for your corn and hay? It seems to figure eighty-five cents for corn and \$20.00 per ton for hay, and a great heap of rich manure. All the plant-food that was removed from the soil is there to be returned, and is the equivalent at least of \$200.00 worth of commercial fertilizers. Now, this is all very nice, but it is a great deal easier to do it on paper than in practice. The average feeder will get no such result.

He puts no good business methods in the business. He buys when the local drover happens to come along, and he pays him a round profit. He thinks it will never do to start on cattle weighing 1,000 to 1,100 pounds, and he buys scrubs just as old weighing 700 or 800 pounds. Perhaps he is not well fixed to feed, or if he is, he wonders why his cattle do not thrive like his neighbor's, who bought cattle in a more thrifty condition.

As a rule there are too many profits garnered between Chicago or Buffalo and Jersey cattle feeders. For instance, I have bought thousands of cattle in Western markets and sold to local drovers at from \$3.00 to \$7.00 per head profit, and they in turn usually get about the same advance, so a feeder is in danger of paying about \$35.00 for what he should get for \$25.00. There is money in the business under certain conditions. A farmer must be fixed for it with a good farm and suitable buildings; he must combine business sagacity with a thorough knowledge of successful feeding. He would watch the Buffalo markets and place himself in correspondence with a reliable commission firm, and they would wire him when to come, and he would put six or seven hundred dollars in his pocket and in two or three days get back with a car of cattle well selected and well bought. He sees a profit in that drove just as soon as they enter his pasture. He has bought from first hands and at a time when the run was heavy and the prices low. That was the business end of the enterprise. He knows how to handle them, and in the spring, when they are fully ripened, his business tact must again be brought into requisition. He visits one or more commission men in the New York and Philadelphia yards, makes the acquaintance of export buyers, and, watching the turns of the market closely, loads up his cattle on a promising market and goes in person with them, either selling them through a commission-house, at the cost of a dollar a head, or sells himself direct to an exporter or wholesale butcher. It must not be forgotten that there are more cattle slaughtered at this time in New York, Philadelphia or Trenton than there was before the advent of Chicago dressed beef. Trenton at present is slaughtering about 10,000 cattle per year, and for ordinary quality is a better wholesale market than New York or Philadelphia; but for choice, heavy cattle, New York is the market.

However, we are forced to the conclusion that the business has declined, and is not generally being conducted with profit. But there

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are farmers who are still in it on a liberal scale, and, being not only good feeders, but good business men, make money out of it, and there is room for more. There is more that might be said under this head, but in the time allotted me I must jump to other considerations. The sheep industry is much more promising, and ought to be more generally followed. It costs less to make 100 pounds of mutton than it does 100 pounds of beef, and besides you are making wool all the time. Further, a pound of good mutton is worth more in the market than a pound of beef. The most profitable feature of this industry is the rearing of lambs for an early market, and New Jersey, owing to her proximity to the large cities, has practically a monopoly of the business.

Having been largely engaged in the past twenty years in supplying stock sheep to drovers, I am able to give you a useful business analysis of the industry, showing how it is done to-day, which, of course, is different from what it was years ago, when the Jersey drover went in person to the farmers of Pennsylvania or Ohio, made up his drove, and drifted them on foot into our State. Fifteen or twenty years ago Ohio and Indiana furnished all the stock sheep that came to us. Now, owing to the decreased supply and a growing home demand, they have none to dispose of at prices to compete with the Northwest. Later, say ten years ago, Kentucky had a large surplus, and our State was mostly supplied from the Louisville and Cincinnati stock-yards, but owing to the low prices of cattle, Kentucky is desirous of getting back into the sheep business, and the few stock sheep coming into the yards for the past three years have been eagerly bought up by Kentucky farmers, so that the past season nearly all the stock sheep brought into this State came from the Northwest, with Chicago as the distributing point. Now, through what channels and what taxes are the Jersey farmers subjected to in reaching their sheep? First comes the wholesale dealer. He is the one who usually gets the largest profit and does the least work. Then comes the retail drover, who buys in car-load lots and deals them out in small bunches. He finds a fair profit and plenty of hard, dusty work. Then come the farmers, who have paid these middlemen at least 25 per cent. profit. But you start out with these dearly-bought ewes and still make plenty of money under proper conditions; but you ask, How are we to better ourselves or economize in laying in our stock? We only want forty or fifty head, and cannot go to Chicago after them, and further, we know nothing about how to go about it. Well, I am here to try and

say something to your advantage, and, although I am in the business, I can afford to tell you all about it, as you are not likely to follow my suggestions, but go on in the old, old way. Now, let me advise you how to go about this sheep business to make money. Every farm in New Jersey adapted to it ought to be stocked next summer to its full capacity. You may want a flock of fifty ewes. If so, you should go in with a neighbor who also wants fifty, and together buy a single-deck car of from one hundred to one hundred and twenty head, or combine enough to make a double deck of two hundred or more, or perhaps you can handle a single deck yourself. However, write to the Superintendent of the Chicago Stock-yards. You do not need to have his name, just address "Superintendent of the Union Stock-yards, Chicago." Ask him to give you the names of two or three of the heaviest receivers of sheep. Address the same letter to the Superintendent of Union Stock-yards, Cincinnati, and the Bourbon Stock-yards, Louisville, Ky. But your order will most likely go to Chicago. You will, of course, receive prompt replies. Then write all the dealers to describe the condition of the market freely, and to telegraph you when the run is heavy of the particular kind you want.

Breeding ewes ought to be put on the farm early in July, but it is not always easy to get them so early ; but still, you send an order to a Chicago sheep broker to get you up a car and he will have no trouble in doing it. If they are not there in straight car lots, he will go from pen to pen and pick up small lots that are willingly sold out from consignments of fat stock ; but late in July and during August they are there in plenty. The usual commission for buying sheep is \$10 per double-deck car. They would draw on you at sight, with bill of lading to order, and it would come attached to the draft. In ordering, you should advise your broker what bank to draw through. The draft and the sheep would arrive at about the same time. You might take a look at the sheep in the car or in the railroad yard before you paid the draft, but you could not get possession of the sheep before paying the draft and presenting the bill of lading to the railroad company ; it is oftener that the draft will be presented for payment before the sheep arrive ; in such a case you would hesitate about paying for the sheep without seeing them. Sometimes a banker will hold the draft until the sheep arrive. Well, suppose when they arrive you do not like them—you think they are not worth the money and you refuse to pay the draft—in that case the railroad company telegraph the

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shipper for instructions, and he wires them to ship them to a commission man in the Philadelphia or New York yards; and unless you could show good reason for such refusal he would have an action against you for damages, that is, if the sheep lost him any money. But, in an experience of twenty years, I have never had an occasion to refuse to receive a single car. The commission men in the Western stock-yards are, as a rule, men of large capital and of the highest business integrity.

Every sheep farmer should get well acquainted, by correspondence, with some good commission firm in the Chicago yards, and so keep well posted about the supply and value of stock-ewes and feeding-wethers during summer and fall.

Such ewes as are mostly in favor in our State, for lamb purposes, are of the open-wool order, and to weigh about 100 lbs. from grass. Such as these were sold, in Chicago, during the last half of July and August, at from \$3.50 to \$3.65 per 100 lbs., in an empty condition. Sheep weighing 100 lbs., from grass, shipped two or three hundred miles, and sold say three or four days after leaving pasture, will drift-off 15 or 20 lbs. Such sheep cost about \$3.00 each in Chicago. The freight is about 25c. per head, or say a cost of \$3.25 to \$3.30, delivered in Philadelphia or Trenton.

We sold several cars of this kind of stock in the Philadelphia yards to a prominent dealer there, and he in turn sold them to Burlington, Gloucester and Salem county drovers, to retail out at from \$4.00 to \$5.00 per head. Now, these same sheep ought to have come direct from Chicago to the farmers, and these three middlemen's profits and expenses saved. There was a very large run in Chicago and St. Louis during August, of what is known in the trade as "Modocs;" they are of the Merino type, and come from the great sheep ranches of the Far West. Some lots are of right good quality and desirable as breeders or feeders. The ordinary quality sold in Chicago in August as low as two and a half cents per pound, and after such long shipments they did not weigh much over sixty to sixty-five pounds, so that the sheep that weighed say eighty pounds from grass sold as low as \$1.50 per head, or equal to \$1.70 delivered on a Jersey farm, as the freight on such is not over twenty cents per head. On a glut in Philadelphia markets some of these sheep sold at about \$1.75 to \$2.00 per head and found their way into Jersey, and farmers thought the pick cheap enough at \$4.00. There are

times after harvest when a farmer who is in communication with Chicago can buy a single or double deck of these sheep, and by running them on grass will make good money, as all local butchers, even though they have ceased to slaughter beef, still continue to handle small stock, and furnish a very profitable market for well-bought stock. In sending a single or combination order for a car of stock ewes for breeders, instructions should be given to get them up even, and if compelled to take a few inferior ones to sell them out there and fill up again. This would make it easier to make a satisfactory division of them at this end. Now, as to the profits derived from the early-lamb business, I am able to present some figures and opinions, as handed me by Mr. A. L. Holcomb and Mr. Amos Sked, both of this county, and who work the capacity of their farms for that branch of stock.

Mr. Holcomb usually buys a car-load of ewes in July, and is good enough to let us have a profit on them. We ship them to him direct from Chicago to Hopewell station. Here is an account of his last year's operations. It will be noticed his sheep cost him \$4.00 per head, and they were good ones. Nothing else will do him. Still he might have got them for less in the way I indicated. Here is an account as taken from his books:

Dr.		Cr.	
140 sheep, at \$4.00.....	\$560 00	125 lambs, net.....	\$761 55
350 bu. corn, at 60c.....	210 00	39 sheep, clipped.....	219 37
3 tons wheat bran.....	51 00	6 sheep consumed.....	24 00
Pasture	100 00	580 lbs. sheep wool, at 30c...	174 00
Balance profit.....	619 72	Money from township for damage by dogs.....	66 00
		8 sheep pelts.....	6 00
		72 sheep on hand, at \$4.....	288 00
	<hr/>		<hr/>
	\$1,538 92		\$1,538 92

Mr. Holcomb remarks that the pasture did not cost him much, as he ran them on new ground before harvest, and after harvest on the stubble, to keep down the weeds and grass, and during the winter he fed them fifteen tons of clover hay and two thousand bunches of corn fodder, all of which was more than compensated for by a very large amount of good, rich manure. He says with sheep nicely bedded the manure will average a load to a sheep. Mr. Holcomb has a very good opinion of the lamb business. Mr. Sked says that notwith-

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standing he has to pay a dollar apiece too much for his sheep, still he finds it the best thing he can do. He keeps about seventy-five head, and aims to get clear of them in March or April. Last year he had seventy head and sold seventy-three lambs, most of which were sold by the middle of April and netted him \$6.31 each, on an average weight of forty-four pounds.

You ask, How do the gentlemen market their lambs? They select a reliable commission firm in Washington Market, New York, and ship them as fast as they get weight enough—some weeks perhaps not more than from six to ten. The freight and commission are not more than forty or fifty cents per head, and by watching the quotations, you know pretty near what your lambs are going to net when you leave them at the depot. My conclusions are that the rearing of lambs for an early market is highly profitable when conducted with business tact, and was never more promising than at present. It is one of the few farm enterprises left us that is not interfered with by States west of the Ohio.

The feeding of hogs is perhaps the least profitable of all, and is manifestly held onto quite generally in the hog-raising counties, more particularly in Burlington and Monmouth. This is explained in a measure by the fact that no business tact is required to place a supply of feeders in your pens. You breed them on the farm, and in a few months they are ready for your corn. You are not taxed by transportation and a lot of middlemen. I am not able to say what it costs you to place a six months'-old pig in your pen in feeding condition, but I am sure there is little or no profit in him after that. If you treat him well with shelter and warmth, he will put on 100 lbs. of flesh for every ten bushels of corn or meal equivalent you feed him, and if you part with him at five cents per pound dressed, you will get fifty cents per bushel for your corn and have some good manure for your trouble.

The best results obtained in hog-raising are in feeding lightly in the summer, while they are on clover, and make a market in September or October, before the heavy runs from the West commence. The farmer who feeds for December, January and February must sell mainly for packing, or at a packing price, in direct and full competition with the great hog-producing States of the West. So, with corn at fifty cents, it costs five cents to make a pound of pork. Corn at fifty cents at the seaboard means corn at twenty-five cents in Kan-

sas. The Kansas feeder makes pork at a relative cost of two and a half cents, and freights it to New York at forty cents per 100 lbs., or say at a cost of about three cents as compared with you at five cents. Of course he does not sell it at three cents; rather, he makes plenty of money, while you barely get the worth of your corn. A large number of fine pens of hogs have been sold in Monmouth and Burlington counties during the past few weeks at from four and a half to four and three-quarter cents, dressed weight; at the same time the Kansas farmers were realizing equal to four to four and one-quarter cents, dressed. Such business as that is simply ruin to the Jersey farmers, and the wonder is that so many still follow it, vainly hoping for a changed condition that will never come.

There is no reason or promise held out to justify our farmers in the insane business of producing pork for December, January and February markets, in competition with the West. We can make some money in buying their stock-cattle, and finishing them up, and the same of converting stock-sheep into good mutton, and the rearing of lambs for the early market, but all these operations call for a combination of the good merchant-business farmer and the experienced feeder.

The reading of this paper was followed by applause.

Judge Forsythe—I move that a rising vote of thanks be extended to Mr. Taylor for his instructive and valuable address.

Unanimously concurred in.

Mr. Taylor—I thank the Board, and am very glad if I have said anything to set you thinking.

SHEEP HUSBANDRY.

The Chair—The next business on our programme is an address on Sheep Husbandry by Hon. J. S. Woodward, of Lockport, New York. I take great pleasure in introducing Mr. Woodward to the Board.

ADDRESS BY HON. J. S. WOODWARD.

Mr. President and Gentlemen of the New Jersey State Board of Agriculture—It seems like coming home to come to New Jersey. My mother was a half-blood Jersey-woman ; when asked what blood I was, I have said I was three-quarters Yankee and one-quarter Jerseyman. That gives me all the persistency of a Dutchman and the shrewdness of a Yankee. I admire the persistency of the Jerseyman, although it has caused me to wallow down here through the snow, which was two feet deep when I started. I have been wallowing in it ever since Tuesday ; and all, through the persistency exhibited by your Secretary, who has been prodding me for two years to come down here, so if you are disappointed, blame him, for nothing but his persistency brought me here

To come to New Jersey and talk sheep, is like carrying coals to New Castle. Before I went into the business, I heard a good deal about New Jersey lamb-raising, and I made a trip down here once to take a lesson, which paid me well.

The successful agriculturists of this country depend upon three things—*sunshine, water and soil fertility*. With these in abundance he can do anything ; if they are wanting, he can do nothing ; if either is in scanty supply, large success cannot be attained. It is a beneficent provision of the good God that the sunshine and air, and water mostly, are without our control ; the soil fertility is within our control, and is the important thing to us. It is a fact that from 92 to 99 per cent. of all plants is composed of those elements which are taken from the

atmosphere, either directly in carbon through their leaves, or indirectly (the water from the soil), through their roots, which, of course, comes from the atmosphere. Because this action takes place solely and entirely through the influence of sunshine, it would not be inappropriate to say that at least 95 per cent. of all plants, is crystallized sunshine. There is another beautiful provision, the sunshine costs nothing, and the part of the plant drawn from the atmosphere by the sunshine does not cost anything. When we throw out a lot of barn-yard manure—mostly wet straw, in my State—we think we are feeding the plant bountifully, but we are not. Not one particle of the carbon applied to the soil in that straw can get into the plant, except it first goes into the air in the gaseous form, and to the plant through its leaves.

The part which should interest us is the little balance of only 1 to 9 per cent. which comes to the plant from the soil, the nitrogen, phosphoric acid and potash. This constitutes the fertility of the soil, so far as we are concerned. This fertility came to the soil from two sources; the potash and phosphoric acid from the rocks from which the soil was made, and the nitrogen from the atmosphere entirely. I take that broad position, and I believe I am entirely correct. The atmosphere is a sea of nitrogen. I got to thinking yesterday while on the cars of the amount of nitrogen in the atmosphere; four-fifths of its weight is pure nitrogen, free and uncombined, and it is a blessed thing that it is so, for if it should combine with the oxygen, it would form nitric acid, and we all, plants and animals, would be in a pickle at once. It is there simply for the purpose of diluting the oxygen so we can safely breathe it. Four-fifths of the atmosphere nitrogen—think how much that is—12 pounds on every square inch—worth in the markets to-day over \$2—\$300 worth on every square foot, \$13,000,000 on every acre of the farm you own. If some shrewd chemist will invent some process of getting this from the atmosphere what a blessing it will be. I may be stating an extreme idea, but I believe this will yet be done, for I cannot believe it an accident that so much nitrogen is all about us in the air; but this is problematical at present.

When this land was taken from the possession of the red men, and was cleared of its burden of timber, the soil was found reeking with fertility, so rich that it responded with crops almost beyond belief, and that to the rudest cultivation. This came to the soil through the pre-

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cesses of nature ; the disintegration and rotting of the rocks, and the growth and decay of ages and ages of vegetable and animal life. Our fathers grew on this soil the crops necessary to their existence, and we have followed in their footsteps, heedless of the results to posterity. All plants are grown at the expense of this natural fertility of the soil, of which they take a specific quantity. Every bushel of wheat takes from the soil about $23\frac{1}{2}$ cents worth of nitrogen, phosphoric acid and potash ; each bushel of potatoes takes $5\frac{1}{2}$ cents worth of these elements. In a ton of clover hay there is over \$9 worth of these elements ; all this is taken in the crop, and leaves the soil so much poorer. Over 75 per cent. of the fertility used in the growth of plants is wasted ; so far as future crops are concerned, not 25 per cent. ever finds its way back to the soil from which it has been taken. Instead of being returned to fertilize the farm, much of this fertility is thrown into the streams, and goes down to the cities to pollute their drinking-water ; instead of being used to fill the granaries and feed the people, it is used to fill the grave-yards and fatten the doctors.

This is one of the crying evils of the present system of agriculture, and the result is that our fields are becoming exhausted. Thousands and tens of thousands of acres of this great country of ours have ceased to be productive to such an extent as no longer to pay the husbandman for cultivation. Witness the many farms abandoned as utterly unprofitable. Not that there is no fertility left in the soil ; on the contrary, most of the abandoned acres contain thousands and thousands of pounds of phosphoric acid and potash, but the trouble is they are in such condition that the plant cannot use them. Nature's processes of preparation are so slow and ours of exhaustion are so rapid that we have exhausted the available supply of plant-food from the soil, and the result is farming them does not pay. It is as though the soil Genii should rise up, pale and gaunt and skinny and pointing its bony fingers at us, should say, "Thus far I have fed you from my accumulated store, but henceforth you must furnish me with assistance if you would reap paying crops."

To-day the husbandman has this important problem to solve, *how best to supply to the soil a part of the fertilizing elements to be returned to him in the crop grown*. This is a very important problem, and it is well that we consider it. There is no doubt but we can supply these elements in commercial manures ; no one questions this. But we do not want to forget that every ton, every dollar's worth, of

chemical fertilizers used is a mortgage on the crop. Don't lose sight of this fact, for it is all-important. If we apply \$10 worth of fertilizer to an acre we virtually put a mortgage of \$10 on the crops to be produced by that acre, and this *must* be met before we can expect anything for use of land or for labor in growing the crop. The question we must answer is, can we afford to do this? There is a very pleasant theory now being iterated by some agricultural writers; it is recommended as almost a panacea. It is "*Chemicals and Clover*." This is a very pleasant alliteration, it sounds extremely well, but how *sound* is it? As I have shown, the use of chemicals mortgages the crop before it is planted, the same whether with or without clover. And clover, the grandest plant given to the husbandman by the good God, has the power of wrenching from the atmosphere a portion of its store of nitrogen, and for the purpose of enriching our lands we cannot grow too much clover. It furnishes to the soil an abundance of humus so essential. It loosens heavy soils, it hardens light soils, it conserves the moisture of the soil. I do not know of any crop I would not sooner lose than clover. But the question is, can we afford to use clover in the way these "chemicals and clover" disciples advocate? Can we afford to put it in the ground, for the sake of its fertility alone? Let us see. Clover has two values, a manurial value and a feeding value. Take an acre of land of sufficient fertility to grow a crop that will make two tons of hay when cured; if it will make two tons for a first crop it will give one ton as a second crop. Three tons of hay are worth three times \$9, or \$27 per acre, which is the manurial value of the crop. Compared with corn meal at \$20 per ton, every ton is worth \$12.75 as stock-food; this would make the hay from the acre in feeding value worth \$38.25, making a combined value of \$65.25. Can we afford to sacrifice its feeding value to realize its manurial value? Look at it. To make the hay and put it in the barn; feed it out, and save and apply the manure, including the loss of fertility by passing it through the stock, will not aggregate over \$11.25, which would leave its net feeding value \$27, which would be lost by using it only as manure; this would be paying \$2 for \$1 for all the fertility applied to the soil. Worse than buying chemical fertilizers. You can't afford it. How can we realize both values? This is the question you naturally ask. The manurial value, I concede, we get if we plow it down. But how can you get the equivalent of three tons to the acre if you plow it down? If you plow early

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you lose the later growth ; if you wait for the full season, the earlier growth is lost. In making hay we get the growth of the whole summer and we have better roots, so I say make hay of the clover and realize both values.

How can we realize both values by the most advantageous methods ? Why, do just as God did, when He built this world. When He made a plant to grow, no matter how far down in the scale of vegetable life, He had an animal ready to eat it. Study this ; it is very interesting. If we would utilize this clover, so as to make it fertilize our soils, we must have an animal ready to eat it. I would not disparage any domestic animal ; from the rooster to the noble horse, I believe in all of them, but I stand here to say that the best animal we have to consume plants, and convert them into money and manure, is the sheep, and this brings me to my subject.

SHEEP HUSBANDRY.

Why is a sheep better than a cow ? Why better than a pig ? Because you can skin the sheep every year, and you can't do that with either the cow or the pig. You can use the sheep to eradicate the coarse grass on your farms. You can use the sheep to rid your farms of the valueless, and worse than valueless, weeds found so common all over the country. You cannot do this with the cow, nor with the pig, nor with any other animal than the sheep. You can use the sheep to protect you as fruit-growers, and New Jersey is a great fruit State. The sheep will keep down the grass and weeds in your orchards, and will eat up the fruit that has fallen to the ground, together with the insects contained in it. Many people think there is no insecticide as good as the pig ; our late friend Colonel Curtis swore by the pig. We will admit, as he used to claim, that the pig is cousin to man ; that is just what ails the pig, there is too much human nature in him ; he sleeps just like a man. When he gets sound asleep, an apple may fall within an inch of his nose, with a worm in it as long as your finger, and he will never wake till the worm is gone ; but the sheep always sleeps with one eye open, and no apple falls so still but what the sheep is there, and before it reaches the ground almost, the apple, worm and all are in the sheep's belly ; that worm has gone to that bourne from which no worm ever returns to curse the fruit-grower. Then again, no animal on the farm, not

even excepting the chickens of our friend over there, makes so good manure as the sheep when properly fed. So you can use the sheep to renovate these worn-out lands. The clothes of every man in this audience, more than nine-tenths of them, are taken from the sheep. We owe the sheep a debt of gratitude we never can pay. Then again, after all this, they will double in numbers every year. As revenue producers no animal equals the sheep. That is, if they are properly kept.

The time was when this country was a great sheep country and when the sheep were kept here for wool and mutton; and the wool was written in capital letters, with a very large W. I remember very well—I am not very old, sometimes I think I am quite a boy—yet I can remember when thousands and tens of thousands of sheep were killed only for their pelts, and the tallow that was in them, the carcass being fed to the hogs. But this is a changeable world; that time is passed, and we can't keep sheep now for their wool alone; we must make use of both their functions, that of meat-growing and wool-growing; we must look to the mutton quality more than to the wool production. Now, how have sheep been kept—how is it now mostly done? In Western New York—I hope you do better in New Jersey—they are turned into a hillside pasture, if one is on the farm, where there is not grass enough for a cow—if very stony, no matter—with weeds and briars and bushes and very little grass, and never looked after, except perhaps once or twice in a month to give them salt, and then, in nine cases out of ten, that is done on a Sunday morning. No water except what they get from the scanty grass, when the dew is on it, or when it rains; and then in the fall they are brought down and turned into a field where the cows have run all summer. Then they are kept during the winter on a little timothy hay, with occasionally a bundle of corn stalks and allowed to run to the straw stack, for we have pretty large straw stacks in Western New York. If they get any grain at all it is a little corn and nothing else. They get no attention, and you will hear the owners say "*sheep don't pay.*" Is it any wonder they shed their wool, and that in the spring every fence corner is disgraced with a dead lamb? Is it any wonder they don't pay, when kept in this way? And this is not the worst part of it either. We, as a nation, think more of dogs than we do of sheep. We protect dogs, and make free commoners of them. A dog can scare your cattle, annoy your wife and frighten your

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children, and you dare not shoot him, for his owner will sue you, and he will call you an awful mean man if you even object to it, but let one of your sheep get onto his premises, and he will *go for you*. Some men think more of their dog than they do of their God, and will do more to defend and serve him. I was walking in the park of one of the finest cities of this country, one day last summer, and saw a well-dressed, good-looking and apparently a sensible American woman, and in her arms she was carrying one of those blear-eyed, snotty-nosed pug dogs, and not twenty feet behind her came the foreign servant girl with her own child ; she was carrying and fondling the dog, and hiring a servant girl to take care of her own flesh and blood. Such things make me ashamed of my country. When you see American young ladies hugging and kissing nasty dogs, it is a shame ; for there are thousands of young men who would almost give their lives for the sake of being in the place of the dog. No wonder the young men don't get married in these days. My advice is never marry a girl that kisses a dog. The *dog nuisance* is the worst obstacle the sheep industry has to contend with.

HOW MAY SHEEP BE KEPT, HOW CAN THEY BE KEPT, AND HOW SHOULD THEY BE KEPT TO MAKE THEM PROFITABLE ?

The last part of my subject I said we wanted sheep to eat the coarse grasses and weeds in our pastures. A good husbandman will not permit the weeds to grow, even if he is obliged to hire a man to cut them. If he hires a man to cut the weeds he must have another man to watch the first or he will go to sleep in the fence corner, and usually he has to watch the last man himself. Pay the sheep for doing this, and they will need no one to watch them. If we put sheep into our orchards to eradicate the weeds and eat the wormy apples, we must not forget that we would have to pay for this kind of work if done by men. Is it fair to ask the sheep to do it without pay ? Certainly not. If we would renovate our lands by the use of sheep, we must remember they cannot add anything to the land except what is in their food. We cannot expect the sheep to improve the ground unless we give them the materials to improve it with. The sheep will do it for one-tenth what it will cost in any other way. We must not expect something for nothing. Do not expect the sheep to live without water ; there is no animal that needs it more, and no

animal that pays better for it. Now, how can we get the sheep to do all these things? How can we have them eat these coarse grasses? A dozen men will say you can't make them eat coarse grass, or make them eat weeds.

If I make any statements that seem radical, don't hesitate to interrupt as I go along, and ask me any questions you like. I always like that.

Mr. J. H. Denise—I would like to ask how it is possible to have the sheep pick up the fallen fruit—that is, early in the season—and at the same time have sufficient pasturage in good growing condition? If there is any special breed of sheep that will do this, I would be glad to know it.

Mr. Woodward—That is a very pertinent question. I came near passing over that point.

How can you get the sheep to do these things? You can't drive a sheep; he is worse than a hog; but if one goes all will go, and never stop. They are more human in that respect than hogs. How to get them to eat fallen apples, suckers and all, that should be kept down in the orchard? You can't drive them to do it, remember, but you can hire them to do it. And they will do it for very little pay. If you want to enrich the orchard with sheep, if you want to manure it well, if you want to keep down the sprouts, and have them eat every fallen apple, just put in two or three times as many sheep as the field will support; that is the way to do it, but don't starve them, thinking to force them to it. No man with brains and a kind heart would think of it; feed them all they need to keep them thriving. You have heard the story of how the man made a fine soup of some clean stones taken from a brook. Well, if you want the sheep to eat stones you must make the stones palatable. The sheep can do that if you give them the material to work with. Feed them on the kind of food to make it necessary for them to have carbonaceous food—feed them on bran, oil meal, dried brewers' grains, or something of that nature, very nitrogenous, and which makes it necessary for the sheep to have plenty of carbonaceous elements to balance the ration. You will be surprised to see what they will do; they will eat everything and anything.

Mr. J. H. Denise—My experience does not prove that statement. I have known them to refuse the apples, and not pick them up.

Mr. Woodward—You were probably feeding them corn.

Mr. J. H. Denise—Yes, sir ; I fed them corn mostly, and a little cotton-seed meal.

Mr. Woodward—I am sorry to hear that in New Jersey you have such poor apples that the sheep won't eat them. I have no such trouble in Western New York. But if you will turn in two or three times as many sheep as the orchard will support, and feed them on nitrogenous foods only, I will warrant that they will take care of the fallen apples, and all that are on the trees, and leaves and limbs as well, that they can reach by standing on their hind legs.

Mr. Denise—How do you keep them from injuring the trees ?

Mr. Woodward—I used to have a good deal of trouble in that line, but I have got the *dead wood* on them now. I buy this chicken wire with about $1\frac{1}{2}$ to 2-inch mesh, three feet wide, costing me about three-quarters of a cent a square foot. I put this around the trees loosely, twisting the ends together, and the sheep won't touch them. I had trouble before, even if I kept them from eating the bark, as they would rub against the trees with their horns, but they don't even rub against them now ; I never have a sheep touch a tree, even if it is small, and the large trees need no protection if the sheep have plenty of good water. But to resume. As I have said, to have them eat the weeds and coarse grasses, and to have them enrich your fields and eat the fallen apples, you must feed them. A sheep can't give you something out of nothing. You must feed them if they are to feed you.

But if sheep are to be kept at the highest profit, there are certain fundamental principles in animal economy, which must be known and heeded. There is no money in the growth of wool alone, so you must comply with certain fundamental rules as to the growth of meat. First, there is no money in the maintenance ration. A certain amount of food is required to keep the sheep without gain or loss ; the maintenance ration, there is no money in that. Let me illustrate : I have a lot of corn I want to shell, and I take a corn-sheller and get a boy to turn it, who is just able to keep it running. I put in a nubbin, however small, and it stops the sheller. There is no power beyond running the machine. All the money I pay the boy is thrown away ; that is the maintenance ration—all the food I feed for that is thrown away. Suppose I do like the darky in Virginia who bought a pig for \$5, and bought \$5 worth of corn ; he fed it to the pig, giving it just enough to keep the pig in the same condition ; when fed up, he had no money to buy more corn, so he sold

the pig for \$5. He said he didn't make anything on that pig, and he didn't lose anything, but he had the satisfaction of doing business the way the white man does it. There is no money in doing business that way, but it illustrated the waste of the maintenance ration. Another point in this connection—*the maintenance ration depends upon the live weight of the animal*. A 50-pound lamb will require only half the food of a 100-pound sheep, for maintenance; remember that, as I shall use it by and by. If it is foolish to keep sheep without growth what shall I say of the man who keeps his sheep in winter quarters, and lets them go out in the spring, starved, poor, many of them half dead? He is an imbecile. He has not only lost the flesh and the growth, that will take half the summer to restore, but has injured the wool as well. The moment the sheep stops growing the wool stops growing, and becomes uneven and weak even to the point sometimes of breaking in two. I know an Irishman who bragged that he got two fleeces every year off his sheep, and thought it was a good thing; he did not know that the two fleeces were caused by starvation, and were not worth half as much as one good fleece. The man who lets his sheep fall off in this way is an *idiot*.

There is no money in fuel-food. All the money we expend for fuel to keep a house warm is so much money burned up, but we do it because it makes the house comfortable, and not because we are making any money out of it. All the food we feed to keep the animal warm is so much money burned up, just as effectually as though put into the stove. More than four-fifths of the maintenance ration goes to keep up the warmth. A temperature of 98 to 100 degrees must be kept up in the sheep, in order that digestion and assimilation may take place. If we put our sheep in warm quarters where it takes less food to keep them warm we shall get more growth from the same food, and more wool. The general opinion prevails that the sheep's wool grows much faster in cold than in warm weather; this is an error. When the sheep is thriving, when the weather is warm, and when the oil in the wool is so plentiful that when you get hold of the wool with your hands you find them reeking with oil, that is the time the wool grows. Keep them in warm quarters and the wool will grow much faster than when running out in the bleak fields in the snows. Warmth saves food, increases the growth of the meat, increases the growth of the wool, and increases our profits. The

legitimate lesson to be drawn from that is that *we should put them in warm folds.*

Another fallacy prevails throughout sheep countries—that if sheep are put in warm quarters at night, and under cover when stormy, they can run out at other times, no matter how cold. That is a humbug of the worst kind. Either keep your sheep *in* warm folds, or keep them *out*—don't be changing; don't put them in at nights, and turn them out in the day-time. Don't keep them in on stormy days and turn them out on pleasant days. If you think this is good policy get up some night, when it is right cold, and go out and sit on your horse block for half an hour and see if you enjoy it. If you don't enjoy it, no more will the sheep. It is wrong, it is barbarous. If you can't house the sheep constantly let them be out, only having a cover to keep off the rain. Again you hear, "because it has a heavy coat of wool, the sheep don't care for wind; only keep them dry, and they don't care for wind or cold." That is all nonsense. These men are fifty years behind the times. You never heard of a polar sheep. Why, sheep are natives of very warm countries, and are very delicate animals, with a skin as delicate as can be—more delicate than a maiden's cheek; now this being true, what does the thick coat of wool indicate? It shows that the sheep is a very delicate animal, which is the truth; and that it needs extreme care, if to pay the most money for its keep. Go out and look after them, and see where they are on a windy day; in the lee of something—a wire fence, if there is nothing better. So I say again, keep them all out or all in; and if to be kept in constantly there are certain indispensable requisites. The lungs of the sheep are as delicate as its skin; it can't stand impure air as well as we can, so that one of the indispensable requisites of a sheep fold is pure air, and plenty of it, which means *good ventilation*. I cannot emphasize this too forcibly. Then there is another foolish idea—I hear it expressed wherever I go. When urged to keep sheep closely housed in *warm folds, these old fogies shout, Exercise!—EXERCISE!* As though we want to keep sheep only for the sake of exercise! We don't keep them for that. There is no money in exercise. Not a cent, unless we turn it into marketable shape. If I were breeding horses, I would exercise them every day, to the limit of safety; if I were breeding blacksmiths I would exercise their right arms constantly, because I would want to develop in each case a muscle that is as hard and

enduring as a whipcord. I do not want that in sheep; a muscle that is tender and juicy is worth ten times as much in mutton. How much exercise is absolutely necessary for health, is the important question; and we want nothing beyond. For certain physiological reasons, I concede some exercise necessary. I may have cranky notions on this point, but I believe exercise is necessary, mostly if not entirely, to work off an imperfectly-balanced ration. If our food conformed to the requirements of nature perfectly, very little if any exercise would be needed. Let me illustrate. The human infant is the most delicate and fragile of all the animal creation; it comes into the world so puny and weak that the least breath upsets it, and away it goes to be an angel. The first six months, the mother is as assiduous as she can be to keep it—how? Why, quiet. When she washes and dresses it she disturbs it as little as possible, and though she is as proud as a mother can be—and no one is so proud as is the mother with her first-born babe, except the father of that babe. She is almost afraid to show it to admiring friends, because it will be disturbed. Does she ever jump and jolt it up and down for exercise? You would say she was a fool if she did. Why not? Why don't that little one need exercise? Because it is being fed on the food that God prepared, its mother's milk, which is, if the mother lives properly, a perfect food, and it don't need jumping around for exercise. Take the Jersey cow. Kept in a condition almost perfect, fed on well-balanced food, she is tied up from fall until spring without going out of her stable once, and in summer she is constantly tied to a stake with a tie less than 20 feet long. What is she? The model butter cow of the world. The model milk cow, the Holstein, is kept in much the same way. Common idea of exercise is fallacious. Very little is necessary with a perfectly-balanced ration. Sheep will get all the exercise needed in close quarters. Put 20 sheep into a pen 18 feet square in a warm fold, and they will take ten times more exercise than they would in a 10-acre lot, unless required to dig their scanty living from under the snow.

If there is no money in the maintenance ration or in the fuel ration or in exercise, whence comes the profit? Simply and solely from the food eaten and digested and assimilated in excess of the maintenance ration. There is the profit, and *it all comes from that*. I cannot illustrate so well as with the cow; we are told that a cow weighing a thousand pounds will require 24 pounds of good hay as a mainte-

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nance ration in our winter temperature out of doors ; that the same cow in warm quarters will be maintained equally well on 18 pounds of same hay. This is a saving of one-third by giving warm quarters. If in warm quarters she have the 24 pounds of hay she will give a production of milk and butter. Now, suppose you add 6 pounds more, making it 30 pounds, and what is the result? By increasing her food one-quarter you will double the product of milk and butter. Suppose she is a good cow, and has a good digestion, and can eat and digest 36 pounds of hay, and what will be the result? By adding 12 pounds she gives three times the milk. In each case the product comes from the 6, 12 or 18 pounds of hay and nothing from the first 18 pounds eaten. She increases her present product 300 per cent. by an increase of but 50 per cent. in the cost of feeding her. Don't it pay to feed her all she can digest? The sheep is no exception to this rule, and as the profit comes from the food eaten over and above the maintenance ration; you want them to eat and digest all they can, and the more they eat and digest in excess of this, the greater the growth in wool and meat. The more food they eat the more product, and the more profit in proportion to the cost of keeping.

There is another point worth considering. *Young animals can eat and digest more food in proportion to their live weight and make more gain than older animals.* They digest it more closely, so that if you want to make a profit you should keep young animals. The moment you keep a wether sheep after it has reached its growth you are keeping it solely and entirely for the wool, and the sooner you can turn it into money the better. Sell them as soon as they are ready for market, and keep nothing in the flock except breeding ewes. It is advisable to keep them, as in raising lambs you get an equivalent to growth of ewes.

I won't say much about the breeds of sheep, as that is a matter of which every farmer has his own notion; if I should say there was one better than another I would be merely giving my opinion. I will say this, however: if you are going to keep your sheep as I have told you they are generally kept, there is no sheep equal to the American Merino; they are "rustlers" from "way back." They will eat closer to the rocks than any other sheep you can get, and they can be kept in larger flocks and will stand more neglect. They are regular Young American get-up-and-get-there, take-care-of-themselves fellows. But they will not pay the best for high keep,

as they are not so well adapted to the growth of mutton. If you would keep the English breeds, however, you must make conditions similar to what they have in their native England. How are they kept there? I was over there three years ago, and looked into sheep husbandry. I saw no flock there, no matter how good the pasturage, that did not get a little corn daily; and corn, with them, means broken oil-cake with a little bran or barley mixed with it, or a little beans, which they get from Africa somewhere—all nitrogenous foods. This is a better country for sheep than England; it has a better climate, and we don't have half the obstacles to contend with that they have; if we had, we would not keep any sheep. If we keep sheep under the same conditions, in our better climate, we can beat them every time. And we will be paid twice for doing it in the gain of sheep, and in the manure, and they scatter the manure better than you can do it with a patent manure spreader. And still I would not advise ordinary farmers to go largely into thoroughbred English sheep of any breed. They will not give them sufficient attention. I would recommend cross-breeding as better. There is something in this crossing of blood that gives a superior product. The cross-bred is superior to the thoroughbred for many purposes. I cite in proof of this, this universal Yankee nation. There is not a nation anywhere can touch them—that can touch one side of them; and this is largely because they are so much mixed in their blood. If there ever was a *thoroughbred cross-breed*, it is the Yankee. For the ordinary farmer, therefore, I would advise cross-breeding. Take for dams the common ewes; I use what are known as Michigan Merinos, which I buy in Buffalo market, and for sires use thoroughbred males of one of the mutton breeds, either a Dorset or one of the Downs. The lambs will be strong, will grow rapidly and go to market worth more dollars, and you can make more money out of cross-breeds than out of any other. If you want to keep up a flock of Merinos, selling cross-bred lambs, you can do so by using a thoroughbred Merino sire on your best ewes, selecting the best ewe lamb to keep up the flock and drafting out the older ewes and those that don't come up to the required standard, on which to couple the mutton sires for market lambs. Continue to keep up your flock in that way, using only your thoroughbred sires of the mutton breeds to grow lambs for mutton purposes.

IN REGARD TO LAMB-RAISING.

I know you are all largely engaged in growing winter lambs, and perhaps you know more about the business than I do. I have in my barns now about 400, and they are now coming lively; I hope to market 800 this year. The longer I follow the business the less I think I know, but of this I am fully persuaded: that unless a man will take care of his sheep to the minute, feed them on the minute—we call him a minute-man—study their necessities, keep his folds in the very best possible condition, crowd his lambs right into market as quickly as he can; unless he has lots of push and will give these matters careful and prompt attention, he had better let the early-lamb business alone. If he will do all this on time, and at the right time, there is nothing that will pay better, and there is no danger of its being overdone. But when shall the ordinary farmer, one who does not care to go into the winter-lamb business, have his lambs dropped? I say unhesitatingly before the dams go to grass, especially if in warm folds. They can then have constant supervision. If any assistance is needed in parturition it can be given; the milk-flow can be controlled, so there will be less danger of milk fever. The farmer has then more time to look after them; and with proper care they can be gotten in condition so that when they go out to pasture every lamb is ready to take care of himself. It is better to have lambs this way than have them dropped in the fields, exposed to the storms and winds, and where they cannot be looked after so constantly; and, besides, the farmer has no time, while busy with his spring work, to care for them properly. It is not a bad shepherd who loses ten to eighteen per cent. when lambing in the field, while it is a poor one who loses three per cent. with them in warm folds.

Now, there is another point in regard to sheep-growing—we *don't want to grow rams for market*. The markets don't like that kind of mutton. It is therefore necessary to castrate the males. When shall it be done? It is usually done when two or three months old. That is not the best time; it should be done when the lamb is not over forty-eight hours old, even if they are for winter market. There is no trouble in doing it then. The shepherd, if he understands his business, can castrate a lamb in a quarter of a minute. The organs are not sufficiently developed so that any blood will be lost, and the lamb never minds it at all; I have seen them sucking within

rutabagas, and silage. Silage is one of the finest of all the foods for sheep. I know the impression has prevailed that silage is not good for sheep; I had that impression myself at one time; I got it from reading, and from what I heard from others. Last winter I tried the experiment to satisfy myself; I wanted to know what effect silage would have on the sheep, and was willing to lose a few sheep to ascertain. I took 42 lambs of the previous spring, separated them as evenly as possible and put them into two pens, all conditions as nearly alike as possible. The two lots varied less than three pounds. To one lot I fed silage with a little clover hay daily and a grain ration of linseed meal and bran and dried brewers' grains; the other pen had all the mangolds they wanted to eat; in addition to that they had clover hay and grain rations compounded as the others. The result was, the pen fed on the mangolds ate more hay and more grain than the pen which had the silage, and when sold they averaged five pounds per head less in weight. This winter I am giving my sheep all the silage they want to eat.

One more point and I am done. In winter-feeding, for best results shear them as soon as well on feed. All our sheep are shorn to-day, and we have over 1,200 in our barns. We commence to shear about the middle of December. We do this for several reasons. One reason is, that two ticks on a lamb are enough to keep it uneasy all the time; and *six lively ticks* will deprive you of all hopes of growth in any lamb. There is no way to get rid of them so easily as to take the fleece right off. Another reason, a flock of sheep will gain fully as much on four pounds of feed if shorn as they will on five pounds with the wool on. That, although a low average, is 25 per cent., and 25 per cent. is a big profit. Look out for these little things. I have also found that the wool grows much more rapidly, and that two shearings of the lamb will give more wool than one shearing. Lambs shorn in December give a fine quality of wool, and when they are ready for market in the spring they have another fair fleece. All my sheep are shorn in this way. I shear my thoroughbreds in the fall, but only once a year, except my show sheep.

Mr. Ege—Can you give us some statistics as to the profits per head of sheep? We aim to get our sheep and lambs off within eight or nine months from the time they come on the farm; we buy Western ewes the first of July, and have them drop lambs late in December or early in January, and sell the lambs when they are about fifty

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days old, and get \$8 or \$9 for them, and then within two months the ewes are ready for the butcher. We feed the lambs by themselves extra food when they are twenty days old, and get them ready for the market at about fifty days old; the price we get is about \$9 per head. We ship by express, five lambs in a crate, putting them on the commission man's stand at 20 cents per head alive. We aim to get clear of both sheep and lambs in eight or nine months from the time they come on the farm. With single lambs we get about \$8, and for twin lambs about \$12 per ewe. If any one can beat this we would like to hear from him.

Senator Taylor told us here about the profits made on sheep. What applies to that will apply to the rest of the farmers. We never turned out our ewes in the spring. We sell them at \$6 per head. They cost from \$4 to \$4.50 in July. After they drop their lambs in December or January we feed them all they will eat. I expect to put my sheep in the market at \$6 per head, weighing 120 pounds, within a week after the lambs.

I would like to know what profit is made in Western New York; do they make more than we do? We have lambs forty days' old weighing forty pounds, an average of one pound a day. At twenty days' old we feed them bran and cracked corn, all they will eat.

Mr. Woodward—Do you give them silage?

Mr. Ege—We feed turnips, cracked corn and bran. That is the ration the winter through. We sell them by the first of March or April.

Mr. Woodward—You are on the road to the kingdom. I sold a little over 800 last year at an average of \$7.68 per head. With my ewes I used to do as you do, only I feed a little higher, and I feed high before the lambs drop; I have even sold the ewes with the lambs. I never sell lambs alive, because we are too far from the market to express them. We have a contract with the express company at \$1 per hundred on dead lambs, packages returned. We send them at all ages, the first being required to be older than afterwards. I have sent them at five weeks, or thirty-five days; we sell them when they weigh forty to forty-two pounds, dressing twenty-four to twenty-eight pounds. One man handles all our lambs, and they are shipped him on orders. Our man orders them by telegraph, so as to get them the next morning.

The very early lambs bring the prices; I have already sold some

at \$12 per head in New York this year. Ewes which breed early one year are more likely to breed early next year, so we sort out our best breeders and keep them over; the others are fed up and go to market with the lambs, or soon after.

Another thing, and my nephew and partner often scolds me for giving it away, after the first lambs go to market we double the others up and have each sucking two or three ewes. We easily teach them to do this; the little fellows soon get so they will follow the shepherd, and when he catches the ewe by the top of her head, one will rush to each side of her to get their dinners. This makes them grow wonderfully fast, and we have had them go out at four weeks old.

Mr. Ege—I am satisfied. I wanted to get the gentleman to let us into the secret. He wants *us* to have *our* lambs dropped in the spring—in March—when he is already putting his lambs into market. He is putting lambs into market now, and he tells the New Jersey farmers to have theirs dropped in March. Do you see the point? I see it. He is *full three-quarters Yankee*. He is putting his lambs in market now at \$10 and \$12 per head, and goes round telling us to have our lambs dropped in March. We are in that secret ourselves; we have sold lambs ourselves at \$10 or \$11 per head, when three of them would about fill a bushel basket. I don't wish to say anything to disparage the remarks of the gentleman, except his advice to have our lambs dropped in March—there I do not agree with him.

Keep your lambs and sheep warm, and don't let them drink icy water; give them plenty of warm water to drink and plenty of bran, cracked corn and turnips to eat. If you have your lambs dropped in December and January, put them in the market when they are forty to fifty days old, at \$12 a head, and if you can't get that take \$9 or \$8 per head, and there is something in sheep-raising.

Mr. Woodward—Do you keep them in the barn?

Mr. Ege—Constantly, and with the doors shut.

Mr. Woodward—I don't allow my doors to be opened at all.

Mr. Ege—You can't stand by them all the time; one of my men left the door partly open this morning; the top part was left open.

Mr. Woodward—If one of my men should leave even a half of the door open I should interview him.

Mr. Ege—He has been with me for ten years, and is one of the best men, without exception, in Mercer county, but he has the grippe and is hardly able to get about at all; I suppose he forgot to shut the door, but he is an excellent man.

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Mr. Woodward—I think the gentleman does not wish to do me any injustice, which he certainly would if he could create the impression that I would not advise you to raise winter lambs. I do not wish to be misunderstood. I would most emphatically advise early lambs, providing the owner or his shepherd will give them the requisite attention, otherwise *no*.

Mr. Blish—I am very glad Mr. Woodward has brought out some of our members and made them tell what they know, for they are loath to do it unless crowded to the wall. [Applause.]

The Secretary—I have felt a deep interest in this subject for years, and I am sorry we cannot give it more attention. In my report I stated sheep properly cared for would add \$4 per head profit for each ewe, but the statements here made are clear beyond that. We have a number of men in Mercer county who are making money in this business.

Mr. Ege—I wish to move that we show our appreciation of Mr. Woodward's address by a rising vote of thanks.

Unanimously concurred in.

Mr. Woodward—I thank you, gentlemen, for your profound and patient attention.

BREEDING AND REARING HORSES.

The Chair—You will now be addressed by Professor Brewer, of New Haven, Connecticut. It gives me pleasure to introduce the Professor to the Board.

LECTURE BY WILLIAM H. BREWER,
Professor of Agriculture in Yale University.

New Jersey once raised more horses than she needed for her own use. Some of the surplus was sold in New York on the one side, some in Pennsylvania on the other, and a few were exported to the West Indies. She was less noted for her race-horses than were the States on either side of her, but her horses for ordinary uses found a ready market, and there were various legislative enactments for the "promotion and improvement of the breed of horses." As farming was then conducted, many farmers considered a foal or two nearly every year as one of the important crops to be considered.

At present this State is a consumer of horses that are bred west of the Alleghanies and brought here in great numbers. They are imported not only to supply our numerous cities and towns, but for the farms also.

In connection with an investigation of the agricultural depression that has visited all the long-settled regions of the United States, and also of Europe, I have looked up the statistics of live stock with much interest. I need not trouble you here with the figures for New Jersey at the times of the various periods of enumeration; suffice it to say that the ratio of horses to that of population has greatly fallen off, and that the rate of decline has been the greatest of late years. In 1850 the State had 140 horses (and mules) on farms to each 1,000 population; in 1890 only 66. That is, the population is increasing so much faster than the horses in numbers, the relative decline

has steadily increased. There are no data other than mere guess as to what proportion of the horses used in this State are grown, but I think there is no question that the ratio has greatly decreased during the past fifteen or twenty years. It is certain that the ratio of horses to farm products has decreased.

It is unnecessary to here discuss in detail the causes of these changes, which, however, are not so great as in my own State, Connecticut. The decline in horse production is much less in this State than in that, but there has been a great decline here also, both relatively and actually. The rapid settling up of the West, as the railroads have been extended and made accessible new lands, has been the chief cause. The farming area has increased faster than the population has, and growing live stock is always relatively greater on new lands than on old, the product is more easily transported, and is better suited to the new conditions. While our government was giving away land for the asking, and railroads trying to make business, stimulating the occupation of new regions, and the new settlers made money by the rapid rise in value of the land they were occupying and bringing into cultivation, farming in the older States had to face an unnatural and unprecedented competition. Changes in facilities for the transportation of farm products and the rapid settling up of great regions in the Western United States have disturbed agriculture as it never was before in the older States of our Union, and all over Western Europe as well. The decline in growing live stock here is one phase of that disturbance, and the phase that has perhaps most profoundly affected the agriculture of the older States.

But the new lands are now all given away and matters are adjusting themselves to the new condition of things. The West is now feeling the "depression" even more than we, and hereafter the competition will be on better terms for us. An increase in horse-growing in the seaboard States will, I think, be one of the results.

The market is at our very doors. There is an increase instead of a diminishing demand. I am old enough to remember that farmers formerly believed that the increase of railroads would lessen the demand for horses. Staging would be killed, and freighting by team would go too. But railroads grew and instead of less horses, more were needed. So, too, now I see every few days in some newspaper that electricity will soon supplant the use of so many car-horses that a demand for horses of suitable size for that use will decline. I have

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no fears of it. Modern civilization is becoming more and more dependent upon horses. The *epizoot* in 1872 and 1873 was a revelation to most people; few had considered how dependent we were upon horses, nor how many it took to carry on business.

An increase in horse-growing in this State will be more easily brought about than in New England, because the breeding has not so greatly declined during the depression here as there. The market is at home, and the demand need not be further discussed. If the farmers of this State want to raise more horses they need have no fear as to a market. The only question is, had we better help supply the home demand from our own farms, or had we better buy our horses and pay for them by raising other crops?

Not only is there a demand for many horses, but many sorts are wanted, so the farmer has great choice as to what to raise. He can consult both his tastes and his resources. He may raise large or small horses, fast or slow; all have a market. As to size, more of medium size are used by the community, and their production is best adapted to the conditions existing on ordinary farms; horses of, say, from 900 to 1,400 pounds. Yet there also is always a market for both lighter and heavier animals than these, should the tastes of the breeder lead that way. The medium-sized, lively horses, for the light traffic of cities, for the grocer's wagon and the light work of the ordinary business man, promise best and are better adapted to the conditions of production on the majority of farms.

Then, too, there is an increasing demand for heavier carriage horses, slower, more staid and dignified than the well-bred fast trotter. For the family carriage they are becoming more and more fashionable, and bring large prices. Crosses of the heavier draught breeds on the medium-sized horses are coming more and more in favor for this use. Grade Percherons are admirably suited for this demand, and there is now some importation of these "*demi sang*," or half-breeds, from France.

In choosing what to breed we must keep in mind that there is a greater and greater specialization of breeds as there is of uses than there was formerly. Some horses can be applied to a greater variety of uses than others, but the "horse of general use" does not exist now—indeed, he never did. If there ever was such a demand it must have been among savages, who had but one use for horses. In every civilized community where horses are used at all they are used for

many purposes, and there is a demand for different kinds and styles for these different uses. We have heard "the general-purpose cow" so shown up and discussed this morning that I need only add that a "general-purpose horse" is still more of an impossibility.

But of whatever style or breed, if there is to be profit in rearing horses in this State, they must be good horses. There is no profit in raising poor ones. A good horse always brings more than his relative worth. That is, the \$300 horse will not necessarily do three times or even twice as much work as the \$100 horse. Increase in excellence raises the selling price much more than it does the actual working value, for looks and style have a higher money value in horses than in any other of our farm animals. A revival of horse-breeding here in which inferior animals were produced would not be profitable. And while there is great variety of choice as to kind, there is one point which all must have—that is, *soundness*.

I wish to speak more in detail of this, because there are peculiar temptations and dangers that beset the farmer in the densely-populated districts of the East that do not the more sparsely-populated West. In the enormous consumption of horses in cities, many are tried which fail and are got rid of before they break down entirely. They either cannot stand the unnatural conditions of horse life in cities, or they may show defects which unfit them for city use, while they are still capable of much work under other conditions. The feet may be too poor for the city pavements and yet give little or no trouble in working in the fields or on the country roads, and many such injured but not entirely worthless animals find their way back to the farms.

With horses as with men who are not perfectly sound, many still "have a good deal of work in them yet," and under the conditions of horse life on farms where the animals work under men who are their owners as well as masters, many unsound animals pass years of their lives without showing their infirmities as they would under city treatment. Thus it happens that many horses, after a few years' work in cities, fail in some weaker part, and before they are entirely used up are sold off to return to the country, where they may do tolerably well for ordinary farm work. Such animals are much more abundant on Eastern farms, where there are so many large cities and towns near, than in the more thinly-populated regions of the agricultural West. If these broken-down animals are mares not too old

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and are reasonably good looking, there is the constant temptation to breed from them, and here the important question immediately arises as to whether this is a safe practice, and to what extent is unsoundness hereditary.

That there is such a thing as "hereditary unsoundness" no one questions, but precisely what in practice should be considered an unsoundness liable to be transmitted, and which should therefore disqualify the animal for breeding purposes, is a mooted question and a very practical one. This subject has been more actively discussed during the last three or four years than ever before. It is one of such importance to breeders in this State because of the reasons stated, that I wish to especially call your attention to it in some detail. It is a subject I have given much attention to, as a theoretical study, and the conclusions here given are my opinions regarding a general law of nature, founded upon a somewhat long and extensive investigation of the statements and observations of breeders and writers, rather than a conclusion founded upon my own personal observation. It is a sifting of the evidence drawn from all sources, rather than a conclusion derived from the experience of any one person.

I will say at the outset that my personal belief is that it is always unsafe to breed from unsound horses, unless we have proof that the unsoundness is due entirely to accident or to mechanical injury, and sometimes even then. While accidental injuries are not commonly transmitted, yet it sometimes happens that a local weakness is transmitted that is apparently due to the accident which caused an unsoundness in the parent. Moreover, it also frequently happens that where an unsoundness is apparently due to some accident and not to an inherited defect, it is still very difficult to prove that an inherited weakness was not really at the bottom of the difficulty. While I would not adopt the cast-iron rule to reject every unsound animal for breeding purposes, whatever the cause of the unsoundness, yet I would use any such with suspicion and only when there are other merits and excellencies which were so pronounced as to justify the risk.

The recent discussions on this subject in Great Britain have been greatly stimulated by the attitude of certain societies and associations in demanding that stallions shown for prizes must have no hereditary unsoundness. The English thoroughbred is essentially a race-horse, but it has so many other excellencies that it has been used more than any other one breed for the improvement of horses of utility. Very

many excellent animals, failing sufficiently to prevent their winning important races, are nevertheless scarcely injured for the most of the uses of common life, and so it happens that there are many unsound sires in actual use. With the establishing of societies for the improvement of draught-horses, especially the shire horses, soundness was made a point in the judging of stallions for prizes, and this has led to the recent movement which has resulted in a parliamentary commission to investigate the hereditary unsoundness of horses. It came about in this way :

From the time of William III., some two hundred years ago, successive sovereigns, for the encouragement of horse-racing as a sport and incidentally for promoting the breeding of better horses, have offered prizes to be run for at the established races. The prizes have usually been cups, plate or other costly trophies, rather than actual money, and so came to be known as "The King's Plate." Although the cost of these prizes was defrayed nominally from the royal purse, in time it came to be considered a sort of government grant for "improving the breed of horses." For generations the race-horse, or "thoroughbred," has been so prominently before the English people's mind, and for a century or more has been held in such special esteem, that its promotion and improvement overshadowed that of all other breeds. It was, until comparatively lately, the only pure breed (with a published stud-book), and hence transmitted its excellencies to a greater degree than animals without a pedigree. Consequently the popularity of thoroughbreds as sires was so great that very many racing stallions, after failing as racers, although more or less broken down, were used as sires for the stock of the country. The increasing number of unsound horses in Great Britain attracted much attention and was made the theme of numerous speeches and essays. Most breeders and veterinarians attributed this increase to the use of unsound sires. In 1887 Professor Axe, of the Royal Veterinary College, London, estimated that "sixty to sixty-five per cent. of our equine population are victims of one or more of the many infirmities now known to be hereditary," and in a paper he ably discussed the loss this entailed on the British people. He estimated that these hereditary diseases cost the farming class not less than four millions sterling, or nearly twenty million dollars. At the same time farmers bred fewer and fewer horses and more and more had to be imported.

Queen Victoria is not enthusiastic over horse-racing, and, moreover,

during her reign there has been a great improvement in the breeding of draught-horses and roadsters. Of late years she rarely attended the races, even where her "plates" were to be run for. As the improvement of other horses than racers came to be more and more important as a national question, it was proposed that a portion of its "Queen's Plates" be transferred from the turf and devoted to prizes for stallions at shows, intended for breeding horses of utility. The Duke of Westminster, "Master of the Horse," had advocated this some years before, but only lately was it actually adopted. In 1885 a committee was appointed and made a report, in 1887 the transfer was made and a commission established rules for judging, and named the number and amount of the prizes to be offered. One requisite was that hereditary unsoundness would disqualify. The prizes ranged from two hundred pounds sterling (a thousand dollars) down; the total amount was large, at least it would seem so to us. At the first show, which was held at Nottingham, in February, 1888, there was such extensive rejection of thoroughbred sires because of unsoundness that it caused great discussion in horse circles all over the kingdom. The newspapers have been full of it ever since, not only the sporting and live-stock papers, but the daily press and the professional veterinary journals. A government commission has taken testimony and made several reports to Parliament, one of which is very bulky. Lawyer-like, it ruled out much testimony relating to all except a very few specified diseases, but all this has had the result to call more attention to the matter than ever before, and to convince breeders that much of the unsoundness that has heretofore been claimed as due to "accident" (such as strains, overwork, &c.) is in reality due to inherited defects or hereditary tendencies, which render the animal liable to break down too easily.

The subject in England attracts more attention, perhaps, because she sells many valuable horses to other countries for breeding. Those are the sound ones. Those bought by the various governments of Continental Europe are required by law to be sound, and private buyers paying large prices will have none other, and thus the unsound ones are left at home to further increase the unsoundness already there. The recent sale of the very celebrated stallion Ormonde, to go to South America, was because he had become a roarer, and several of his family also had the defect, so the nobleman who owned him sent him out of the country, notwithstanding his other good qual-

ities, thinking that in South America, where the defect was not so common, it might perhaps be eliminated in his descendants, while in England it would only tend to increase the number of animals having this unsoundness.

There are just now two lines of investigation actively going on in the scientific world, conducted in the interests of pure science, but which are of vast practical importance to both man and his domestic animals, and have a direct bearing upon this question. They relate respectively to the nature of "hereditary disease" in man and brute, and to the possibility of "the inheritance of acquired characters."

We are all familiar with the term hereditary disease, and usually mean by it that some man or animal has a disease because a parent or ancestor had it. The question being investigated is, is the disease itself transmitted? It is now believed that in the majority of cases it is not, but rather that a constitutional defect is transmitted, which increases the liability of the offspring to contract the disease the parent had. Also, that a parent having some local weakness and breaking down in that part, transmits a similar weakness to its offspring, and they in their turn break down in the same way. In either case the actual disease or the unsoundness is not born with the offspring, but develops sometime during its life. The young animal may be, and usually is, healthy, and the defect only shows itself after maturity. The common form of hereditary disease is not the transmission of the actual disease, but only a tendency, and in mankind this brings the cheering hope that by special care the disease itself may be entirely averted. In our animals it impairs their usefulness and lessens the period of work.

"The inheritance of acquired characters" is also just now under very active discussion and investigation among biologists. It simply means this: Are the characters acquired by the individual, but not born with him, ever transmitted to offspring? A belief that they are, to some extent, transmitted, has been held from the earliest times. This has been, and is still, the universal belief among breeders, and it has also been believed by all scientists and biologists until recently, but lately another theory has been proposed which denies it *in toto*. The eminent biologist, Professor Weismann, holds that such characters never are, and indeed cannot be, transmitted. He states his theory so very positively and defends it with so much zeal and skill that he has drawn to it many of the more eminent biologists of the world.

This theory teaches that training one generation of trotters does not increase the speed or the tendency to trot of the next generation; that stunting the growing animal by poor care and insufficient food, or increasing its size by care and feed, do not diminish or increase the size of succeeding generations, and so on. I do not believe this theory, and yet it is more difficult to prove its falsity than seems at first sight.

Let me illustrate. Mutilations and mechanical injuries are rarely, if ever, transmitted. Some kinds are apparently transmitted, other kinds so rarely that one can say never. For example, we have cut off the tails of sheep for countless generations, yet each generation of lambs have tails as long as their ancestors. Whether mutilations and mechanical injuries are ever transmitted or not, it is certain that they are so rarely transmitted that it need not seriously affect practice in breeding. And yet the question has its practical side. A stallion may be lame from a broken leg, or blind from an accident and the defect not be transmitted, as a rule, and yet there are instances enough where a defect is transmitted that it seems to me to prove the unsoundness of the Weismann theory. An apparently accidental unsoundness may, however, be in reality due to an inherited defect or weakness. I once knew of a blind stallion whose blindness seemed to be purely accidental. An injury to one eye destroyed it after a severe inflammation which last some months. The inflammation finally extended to the other eye and destroyed the sight of that also, leaving the horse entirely blind. In other respects he was sound, but many of his get ultimately became blind. None were foaled blind, but from one cause or another their eyes failed. A weakness was certainly transmitted to his offspring which ultimately led to the loss of sight. Whether this sire had originally an inherited weakness also, which led to his losing the sight of the second eye after the injury to the first, or whether the defect which was "acquired" by him was transmitted, we do not know—we can only guess.

It is not easy to establish the law governing such facts by actual experiment. It must be deduced from the careful collection of many facts and noting what they point to and how they are correlated with other facts. What is a law of nature is not to be decided by verbal skill, nor mere logic, nor by expert use of language, nor by the introduction of new names for old things. My personal belief is that acquired characters are sometimes transmitted, and mere mutilations

too, but this is not at present susceptible of proof that is convincing to all. It is now accepted as a satisfactorily proven biological fact. If true, however, it is not sufficiently common to be of much importance in actual practice. The weakness that arises from disease is more liable to be inherited than that from mechanical injury, is not to be ignored in this connection.

I have dwelt more on this part of my subject, partly because of the especial temptations that lie in our way, and partly because I think that the average farmer is too careless in this matter and does not fully appreciate its importance. If New Jersey farmers are to make horse-growing more profitable they must raise sound horses. I have no belief that breeding cheap, poor, unsound animals can ever be made profitable here.

Then, too, the temper or mental capacity or disposition of breeding animals should be considered. I was intensely interested this morning in what Gov. Hoard had to say about the nervous character of the milk breeds of cows. The contrast he spoke of is even more marked in horses. We want nervy horses, but by this I don't mean nervous, fearful, shy creatures. On the other hand, a horse of nerve, like a man of nerve, has courage, abiding courage. Shyness, timidity is largely due to lack of education, although some animals are by nature more timid than others. Most horses have a curious fear of whatever is unusual, and they must be taught aright, educated and accustomed to the varied things they are liable to see. Skittish horses are the result of bad training, although some horses are naturally more liable to it than others, for the mental character of horses is even more a matter of heredity than with men. Gentleness, while partly due to education and handling, is also partly due to heredity, and so is viciousness. I have known successive generations of horses to have the same vices, and when we say that they "took to it naturally" we mean merely that it was hereditary.

The quiet farm-horse, with gentle and tame instincts, has the kind of disposition which makes a popular animal for a great variety of uses. It does not mean dullness nor laziness, and may be correlated with much spirit and endurance. The pure Arabian is by nature one of the tamest of breeds, but is also very spirited. A highly-nervous organization does best where great results are sometimes suddenly required. The great achievements on the turf, where so many thousands of dollars in winnings may depend upon a second of time, require not only a horse with a frame that can do but also a will to do.

The farmer must consider all these matters. Highly-nervous animals are best bred by those who make a specialty of breeding. The horses to be bred by the ordinary farmer had better be of the tamer strain, simply because they better suit his facilities. But these different kinds only illustrate anew what I have so often repeated, that in the modern specialization of uses we must have specialized horses. A livery-stable horse that is too free and too spirited is not a profitable animal to the liveryman; it may be used up by the first ignorant customer. For this use an animal need not be very ambitious; one that don't care whether another horse goes by him on the road or not; not too thin-skinned; not too sensitive; one that can travel if need be, but who needs much encouragement and frequent admonition. Such horses last better in that business. Maud S. and Sunol are supreme in their own specialties, but I fancy that neither would be a success in a livery stable or on the horse-car.

We must keep in mind the difference between breeding on large farms, where many animals are kept and horse-breeding the chief aim, and on small ones, where but few are kept and where breeding is secondary to other productions. That is what I am specially discussing now, that farmers who have but two to half a dozen horses, so manage as to raise a colt or two each year. While brood mares cannot be depended on for heavy work, they are equal to most of the kinds of work needed on the farm for three-fourths of every year, and this work will do them more good than harm if intelligently managed. I have plowed and harrowed many a day with brood mares. In recommending medium-sized horses as best for the ordinary farmer to breed, I had in mind that that kind is large enough for the most economical use on the great majority of farms; the raising of the heavier draught-horses is more profitably done in greater establishments than most New Jersey farms are.

Bear in mind that I am discussing the availability of small farms for this. On large farms, and where much capital is employed, the problem is very different. Breeds of live stock are rarely improved on small farms; there we can only use the results gained on large farms. England, with her large farms and great estates, managed by intelligent men, has been the source of nearly all the improved breeds of stock in use. Continental Europe, where small farms and peasant farmers are the rule, have sent us very few improved breeds. In this country the farmers, even on small farms, are not peasants and use the

results of science or enterprise more than do the peasantry of Europe, yet the conditions on such farms are such that good breeds are not developed there.

Horses constitute an essential part of the military strength of every civilized country. Where the people cannot be trusted to grow horses in sufficient numbers or of sufficient excellence for the military use of that nation, the government must help, for horses are implements of war. Consequently, in all those countries of Europe where the agriculture is in the hands of a peasantry, there is government aid in some shape. England has not aided, except by the "royal plates" or more recent "Queen's premiums," but nearly every country of Continental Europe has its government establishments. Prussia, Austria, France, Russia have each their government studs. They are conducted in different ways under the several governments, but in each case the aim is to supply superior sires in districts where horses are grown, and to thus encourage the breeding of a good class of animals, "horses fit for war and for peace." Austria owns two thousand stallions, and several other countries are not far behind in numbers.

The United States may be called on to help supply the European deficit, and surely will, should there be any considerable war. For army use abroad, horses of about a thousand pounds, or a very little heavier, are the most in demand.

France as well as England is complaining of a constantly-increasing deficit, despite the government aid so long extended. The country has now nearly a million fewer horses than she had twenty years ago at the close of the empire. Great exertions are now being made by the government to encourage horse-growing and improving the quality as well as increase the numbers. English thoroughbreds are crossed upon the native stock, and produce very serviceable animals. She looks after both the promotion of horse-breeding as to numbers, and after the improvement which her small farmers cannot be depended upon to look after. She has not only her government "*haras*," or stud establishments, but by a law of August 14th, 1885, looks after the soundness and character of the stallions in private ownership, which may be advertised for public use, and the law is rigidly enforced. It provides that a stallion cannot be employed without being first approved and authorized by the Administrator of the Aaras (equivalent to Master of Stud), and he must have a certificate that the animal is free from certain specified unsoundness. This

certificate is available but for one year, and is given only after an expert official examination. Violations are punished by fines imposed both on the owner and the groom. Every owner of a stallion advertising his animal for breeding purposes must notify the Prefect, and the animal is inspected by a committee consisting of a veterinarian, a breeder and a government inspector.

By such care and with the aid of the National Stud Establishments, "*Haras*," it is hoped that the horse population may be brought up to the standard which is requisite for the military strength of the nation. It only illustrates in another way the care now found necessary to insure the soundness of coming generations of horses, in order to correct the evils due to carelessness and ignorance of previous times.

In closing, I will only add that horses from the hilly regions of this State have been long believed to be hardier than those from the Western States. I am told that they are better for city use; that their feet last better on city pavements than do the feet of animals raised on the softer prairies. That is a drop in our favor.

I have not discussed the matter of the relative value of hay and grain here and in the West, because there are so many things to be considered if one once opens up that question. The New Jersey farmer can sell his hay for a better price than the Western farmer can, but if he keeps it up long he must buy more fertilizers. The value of land and the cost of fertilizers come in to complicate this part of the question. There is no other one crop where so little is carried from the farm in proportion to the receipts as with horses. It seems to me that the promoting of horse production should be kept before our farmers at these conventions, and that this is the proper organization to encourage and promote this farm product.

A rising vote of thanks was extended the speaker.

ORNITHOLOGY, MAMMALOGY AND BIRD MIGRATION.

The Chair—Dr. Merriam is with us, and we shall be glad to have him address the Board. I take great pleasure in introducing Dr. C. Hart Merriam, of Washington, who will now address you on the subject of Ornithology, Mammalogy and Bird Migration.

ADDRESS BY DR. C. HART MERRIAM.

Mr. President and Members of the State Board of Agriculture—By an arrangement between your energetic Secretary, Mr. Dye, and our equally energetic Assistant Secretary, Mr. Willits, I am here this evening to say a few words about the work of the Division of Ornithology and Mammalogy of the Department of Agriculture, a division engaged in the study of problems of great importance to agriculture.

The work of the division comprises two distinct lines of research, carried on by independent sections—a Section of *Economic Relations*, and one of *Geographic Distribution*. The Section of Economic Relations has to do with the study of the food-habits of such birds and mammals as are directly injurious or beneficial to agriculture, and with the means the farmer may employ to lessen his losses from the injurious kinds, and to encourage the beneficial kinds.

My assistant, Professor Barrows, who has charge of the Economic Section, has kindly consented to come here this evening, and will speak to you concerning that aspect of the work; hence, I shall confine my remarks to the work of the Geographic Section.

Those of you who have traveled know from observation and personal experience, and those who have not traveled know from reading and from conversation, that the various kinds of animals and plants are not universally distributed or spread over the whole world, but occur in particular districts having definite or circumscribed

bounds. You all know that the lion, chimpanzee and gorilla are found in Africa; that the orang-outang lives in Borneo, and that the llamas and chinchillas inhabit South America. You know also that many animals are restricted to areas or zones of particular climatic conditions, as, for example, the arctic fox, polar bear and musk ox of the Arctic Circle; the bobolink, catbird, oak and maple of the north temperate zone, and the monkeys, parrots and palms of the tropics.

The Division of Ornithology and Mammalogy is investigating the geographic distribution of the animals and plants of North America, and is constructing maps showing the precise limits of dispersion of each species; these are called *species maps*. Other maps show the areas inhabited by particular assemblages of mammals, birds, reptiles and plants; they are designated *faunal maps*.

During the past season we have been engaged in a biological survey of a large area, comprising about 100,000 square miles of territory in California and Nevada, extending from the Pacific sea-coast south of San Francisco bay to the 113th meridian in western Utah and Arizona, between the 34th and 38th parallels of latitude. This expedition came to be known as the "Death Valley Expedition," because its first explorations were made in Death valley and neighboring deserts in southeastern California and southern Nevada. This region was worked during the winter season, as the temperature is so high in summer that it would be almost impossible to do the work then. The members of the expedition were scientific experts—mammalogists, ornithologists and botanists—and enormous collections were made, aggregating about 1,000 birds, 1,000 reptiles, 6,000 mammals and nearly 20,000 plants. Doubtless you think the enrichment of our National Museum by this vast amount of material, in bulk and quality far superior to anything collected by previous expeditions, is of great value from the purely scientific standpoint, but you may not see what connection it has with practical agriculture. This I shall try to make clear later.

In studying the torrid deserts of the Southwest with reference to the distribution of life, it is found that they are characterized by assemblages of mammals, birds, reptiles, insects and plants not inhabiting any other part of the world. All the plants of this region have developed some structure or habit which enables them to endure the heat and drouth of the long summers. The great majority are spiny; some are provided with true leaves protected by varnish, others carry

leaves for a brief season only, while in others still the stems perform the function of leaves. The most conspicuous of the desert brush of this area is the creosote bush *Larrea Mexicana*, which was found by Frémont in 1844 when he passed out of the interior basin of California and crossed the Mohave desert on his way to Utah. This brush grows on the gravel soils of all the Southern deserts from Mexico and Texas to Southern California. It differs from the other desert species in having dark-green leaves covered with a sort of varnish to prevent evaporation, and in retaining its leaves throughout the year. Most desert plants have pale-olive leaves that fall off when the hot season begins. Many of them put on their leaves in March, bloom in April and drop the leaves in May or early June; during the remainder of the year they are apparently dead.

But it is not my purpose this evening to describe the peculiarities of this vegetation. The characteristic plants are spread uniformly over the region, the only interruption being due to breaks in the continuity of the particular soil to which each species is adapted. Wherever the gravel soil gives place to an alkaline, clayey soil the character of the vegetation changes; the creosote bush and other plants that grow with it disappear and their places are taken by greasewoods of the genus *Atriplex* and by other species. So the saline soils, the lime soils, and the soils of decomposed lava have each their characteristic assemblage of plants which repeat themselves as often as their favorite soils recur. Other changes are brought about by differences in the quantity of moisture in the soil, some plants living only on wet ground, and others only on dry ground. But all of these differences are due to purely local causes and are in no way dependent on climatic conditions. It is well known, however, that climatic conditions are the controlling factors in the geographic distribution of species in continuous land areas. The great majority of mammals, birds, reptiles, and plants are governed in their distribution by temperature and humidity, and temperature is known to be more effective than humidity. Hence it is found that a number of species of animals have a range coincident with that of the creosote bush, greasewoods, yuccas and cactuses of the Sonoran deserts of the Southwest, and that the area over which they occur receives a definite amount of heat in excess of the heat of the Great Plains and Great Basin in the North, which areas are inhabited by different assemblages of species. With the creosote bush and associated plants are found a

small, long-eared fox inhabiting no other part of the world, the four-toed kangaroo rats, peculiar pocket mice and scorpion mice, the black-throated desert sparrow, desert thrasher, cactus wren, the horned rattlesnake, leopard lizard, and gridiron-tailed lizard—species which seem to enjoy the intense heat of the deserts.

The desert region is beset with mountain ranges, most of which are barren, rocky and nearly devoid of vegetation. Some of them, however, are of a different character, their sides being dotted with bushes and other plants, and their summits, when attaining sufficient altitude, being clothed with coniferous trees. In ascending such mountains one leaves the desert species that have been mentioned and passes through successive zones of animal and plant life, each characterized by the presence of species different from those above and below. The number of the more important life zones is six, and all of them without exception exist on every mountain that rises from the Sonoran deserts to a height sufficient to give it a timber-line. Precisely the same zones are encountered in traversing the continent from the highlands of Mexico to the Arctic Circle, only in the latter case each is so broad, and occupies so great an extent of country, that they are much more difficult of connected study.

In climbing some of the mountains above referred to, the most conspicuous plant of the zone next above the Lower Sonoran desert is the true sage brush (*Artemisia tridentata*), which is the characteristic and dominant plant of the Great Basin in Utah, Idaho, Nevada and eastern Oregon and Washington. Whenever a certain altitude is reached the creosote brush stops and is replaced by this sage brush; the horned rattlesnake disappears and its place is taken by an entirely different species; the large leopard lizard and the gridiron-tailed lizard disappear and are replaced by a small striped species; the desert thrasher and black-throated sparrow are no longer found, but in their stead are the sage thrasher and the sage sparrow; kangaroo rats and pocket mice still abound, but they belong to different genera from those of the lower deserts—and so on with other forms of life. Above the sage brush is a belt of juniper and nut pines; and above this still is a zone of tall yellow pines, with corresponding changes in the associated animals and plants. The species just referred to disappear, and other birds, other reptiles, other mammals, and other plants appear. Wherever the mountains are sufficiently high, they are clothed with forests of spruce and fir and a great variety of humbler

plants that are common in New England and Canada. In short, the various species of the spruce and fir zone of our Western mountains are Northern, or "Boreal" species. Some of the mountains push their lofty summits up to such a height that they penetrate an icy atmosphere in which tree growth is impossible, but where a few humble plants manage to maintain a foothold among the barren rocks. These are arctic circum-polar species, and many of them thrive along the shores of the Polar Sea. Some of the same species grow on the higher peaks of the White Mountains of New Hampshire and the Adirondacks of New York ; and identical or closely-allied forms inhabit the Alps and many other lofty ranges of the Old World. Mammals and birds are very scarce in these elevated areas, and reptiles are absent altogether.

The number of principal belts or zones in this country north of the Tropical is six, as has been stated, and they may be grouped under two heads, Northern, or Boreal, and Southern, or Sonoran. The Northern, or Boreal region is subdivided into three zones, the *Arctic*, the *Hudsonian* and the *Canadian*. The Arctic zone is beyond or above the limit of tree growth. The Hudsonian and Canadian zones are timber-covered, comprising the great forest of fir trees that extends across the continent from northern New England and Labrador to the mouth of the Mackenzie river and thence to Alaska and south to California.

The Southern, or Sonoran region occupies nearly the whole of the United States south of the Boreal region, except along the ranges of high mountains, and reaches far south over the table land of Mexico. Between these two great regions is a comparatively narrow belt known as the Neutral or Transition zone, which extends completely across the continent and is characterized chiefly by the overlapping of species belonging to the Boreal and the Sonoran regions. It is the "petering-out" zone, so to speak, between the Northern and Southern forms of life.

Now, turning to the eastern part of North America, I would like to call your attention to a few characteristic forms of animal and vegetable life of each zone or belt.

In the Arctic zone, away above timber-line, are numerous small plants, such as the arctic poppy, dwarf willow, saxifrages, gentians and many other species. In the same zone we find the true snow bunting, or snowflake, the snowy owl and the white ptarmigan, and

also the musk ox, the polar bear, the polar hare, the arctic fox, two species of lemmings and the barren-ground caribou, or reindeer. In the zone next below (the Boreal forest zone) we find the spruce and birch, and in the southern edge of this zone the beech and the maple. The dominant mammals are the wolverine, fisher, marten, porcupine, ermine, red squirrel and the woodland caribou and moose; among the birds are the pine bullfinch, crossbills, the white-crowned, white-throated and fox sparrows, and numerous others that do not breed anywhere below the southern limit of the Boreal zone.

In the Neutral or Transition zone are found the indigo bird, oriole, catbird, bluebird, brown thrasher, chewink and others that come in from the South, together with some northern forms that here find their southern limit. The same is true of mammals, for here we find the Northern red squirrel, porcupine, jumping mouse, woodchuck, chipmunk, red fox and star-nosed mole living in company with the Southern gray squirrel, common mole, cotton-tail rabbit and so on. The common trees of this neutral region are the oak, hickory, chestnut, walnut, maple and beech, the latter being most common in the North.

In passing to the next zone to the south—the Upper Sonoran zone—another association of species is found. The opossum, gray fox and fox squirrels here first make their appearance. Among the common birds are the Carolina wren, cardinal, tufted-tit, gnatcatcher and many others with which you are familiar. Among trees are many that are well known to you, as the sassafras, tulip tree, hackberry, sweet-gum, sour-gum and persimmon.

Still further south, beginning near the mouth of Chesapeake bay, another change takes place, for here we enter the Austroriparian or Lower Sonoran zone; the long-leaved pine, magnolia and live oak become common on the dry lands, and the bald cypress and cane in the swamps, and they are soon joined by the palmetto. The mockingbird, painted bunting, red-cockaded woodpecker and chuck-wills-widow became characteristic species of birds. Many mammals make their first appearance in this zone, as the cotton rats (*Sigmodon*), rice-field rats (*Oryzomys*), wood rats (*Neotoma*), harvest mice (*Reithrodontomys*), pocket gophers (*Geomys*), little spotted skunks (*Spilogale*) and free-tailed bats (*Nyctinomus*). This is the southernmost zone that stretches completely across the United States, but the southern half of the peninsula of Florida is encircled by a subtropical belt, which consists

largely of West Indian and Central American types. Among the trees of this belt that are unknown further north are the royal palm, Jamaica dogwood, machineel, sea-grape, mahogany and mangrove; and among the birds, the white-crowned pigeon, Zenaida dove, quail doves, Bahama vireo, Bahama honey-creeper and ani.

What significance have these facts to the practical agriculturist? They have this significance: These several zones or areas that are characterized in a state of nature by the presence of particular and definite assemblages of animals and plants are adapted to the growth of particular agricultural products. Each zone or area differs from the adjoining area in the most important of climatic factors, namely, *temperature*, and the characteristic temperature of each zone affects the plants and animals brought there by man, just as it affects the species found there in a state of nature. In passing southward from Greenland and the arctic border of our continent, we find no crops above the limit of tree growth, and only a few in the Boreal forest region—for not a single agricultural crop is characteristic of the whole of the vast tract that stretches from Labrador and the Gulf of St. Lawrence to Alaska. It is true that potatoes, turnips, beets and the more hardy varieties of wheat and barley thrive in the southern part of that region, and that several kinds of indigenous berries flourish there, which, while utilized to a large extent by the natives, have comparatively little commercial value.

In passing southward to the next belt—the Neutral or Transition zone—we enter the true agricultural part of our country. In this zone the apple, the plum and the cherry reach their highest perfection; and the white potato, barley, oats and a number of different products attain their maximum development.

Immediately south of the transition belt is the Upper Sonoran or Carolinian zone, which is the home of the peach, the apricot, the sweet potato and the tobacco plant. Here also the hardier kinds of grapes, such as the Concord, Catawba, Isabella and fox reach their best condition.

The Austroriparian or Lower Sonoran is the zone of the cotton plant, sugar cane, rice and citrus fruits—the orange, lemon, lime and shaddock—and of the pecan and peanut, and in its sub-arid continuation in the West, the olive, almond and raisin-grape are among the most important agricultural products, and the fig ripens several crops each year.

In the subtropical belt of Florida we find the banana, cocoanut, the date palm and the pineapple.

The kinds of fruits and vegetables above mentioned are only a few among many, but are enough to show that each of the life zones, characterized in a state of nature by a definite assemblage of animals and plants, is equally adapted to the successful production of particular crops and strains or breeds of stock.

It is the purpose of the Department of Agriculture to map the boundaries of these various zones with as much precision as possible from a study of the native plants and animals; to carry the work entirely across the continent, and to show the exact courses of the several zones by the use of different colors on a large scale map. These maps will be valuable to the agriculturist by showing him the position of his own farm with reference to the life zone in which it lies, thus telling him just what crops ought to do well on each kind of soil and what crops will not thrive there, for the northern limit of fruits and vegetables is sharply defined by nature. It is not unusual, particularly in mountainous districts, for a piece of land to be so situated that the distinctive crops of two different zones may be grown successfully—the more northern on the higher hillsides, and the more southern in the low valleys or river bottoms.

It is poor economy to waste time and labor in trying to grow a crop that will succeed only one year, perhaps, in eight or ten, and fail the other years. On the other hand, it is a recognized law of trade that the further from its center of abundance a particular crop can be made to thrive the better price it will command; hence it is of the utmost importance to utilize the northern prolongations and islands of the southern zones, and the southern prolongations and islands of the northern zones, for the production of agricultural products that otherwise must be transported thither from a considerable distance and at corresponding cost.

The existence of the life zones is the result of the prevalence of different climatic conditions over different areas, and the most important single climatic factor is temperature; the next is humidity—but I will not go into further details at this time.

Much more might be said, Mr. President, respecting the geographic distribution of animals and plants in relation to agriculture; but my time has expired, and Professor Barrows will address you on the more purely economic work of the division—the work relating to the food-habits of species.

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The Chair—I have the pleasure of announcing that we have with us another gentleman from the Department at Washington, Prof. W. B. Barrows. I am glad to introduce him to the Board, and he will address you on matters of interest, as stated by Dr. Merriam.

ADDRESS BY PROF. W. B. BARROWS.

Mr. President and Members of the Association—In speaking to you about the economic work of the Division of Ornithology and Mammalogy it will be impossible to do more than glance at some of the points we are trying to make, hoping to give you an idea of the work we mean to accomplish by means of some few examples, rather than try to go over the whole ground. We take up some one subject and push that as far as possible. We began, for instance, five or six years ago, with the study of the English sparrow, a bird with which you are all familiar, as a recognized enemy of the agriculturist. We were not alone in the study of this bird, but were aided by the voluntary efforts of thousands of careful observers, and you are more or less familiar with the results of some of their observations. You all know the results of the importation of the English sparrow, but I have not the time this evening to go over the whole subject. We began by mapping the distribution of the English sparrow since its first importation into Brooklyn, N. Y., about 40 years ago, and recording the successive importations and migrations since that time. Our whole country is now coming under the ban of this bird, and probably there are few if any towns of 2,000 inhabitants in the United States where the English sparrow is not seen to-day. He is still spreading into the most remote and inaccessible spots, even as far north as Manitoba, and will continue to extend his range wherever food is obtainable in winter for his subsistence. What is to be done about it? We have already given to the agriculturists of the United States most of the information we have on the subject, but we much regret that it has not been used in more cases.

It was clearly shown by the first year's results in Michigan that the payment of bounties for sparrow extermination was worse than useless, but Michigan is still paying bounties on the English sparrow—doing no good—wasting money which might be used to advantage for other purposes. Ohio learned little from Michigan's failure, and passed a bounty law of her own. Last year Illinois did the same

thing, and is now paying bounties on English sparrows. The bounty law has been an utter failure in Michigan, an almost complete failure in Ohio, and will be equally useless in Illinois. It is true that thousands of sparrows will be killed, but they are but as a drop in the bucket compared with the number left. The money expended for the few thousands killed might be applied to other modes of extermination far more likely to succeed.

The payment of bounties is not only an expensive method, but it does not accomplish the purposes desired. On the other hand, it may accomplish those which are not desired. In Michigan there are eighty-two counties, and in one-third of these counties, perhaps, the English sparrow is not harmful; possibly in one-half these counties it does not exist in any great numbers, but where the English sparrow does not exist, County Clerks do exist, who do not know the difference between English sparrows and similar birds which are not injurious; and so long as we have these conditions, birds of some kind will be killed and bounties will be paid. County Clerks are not ornithologists, and to tell the head of an English sparrow from the head of any similar bird is not a simple matter, since the heads of many other birds bear a close resemblance to the head of the English sparrow, and few but experts can tell the difference. In many cases in Michigan the heads of other birds have been brought forward, and bounties have been paid on them, whether unwittingly or knowingly—often on the heads of perfectly innocent birds. In Pennsylvania, a few years ago, under the act giving bounties on hawks and owls, bounties were paid on the heads of night-hawks, as well as of partridges and other birds, many of which are actually beneficial to agriculture. Such things will continue to occur as long as such laws are in force.

In Michigan the provision was made that the bounties should be paid from the contingent fund, but in some counties there was no contingent fund, so that no bounty could be paid. It was also provided that the bounty should be paid by the County Treasurer on the order of the County Clerk; but in some counties it was illegal for a Treasurer to disburse any money except on warrants from the Board of Auditors, so the law had absolutely no effect in many of the counties. The total number of sparrows on which bounties were paid in 1887 in Michigan did not exceed 30,000. Of course you can readily see the effect was not appreciable where the numbers remaining were so large. In the city of Indianapolis, Indiana, one man trapped over

40,000 sparrows in two years, and yet there was no marked effect, no appreciable diminution of the number there. Now, what is the prospect in Michigan? Bounties are worse than useless, and some other means for the extermination of the sparrow must be devised. We recommend the use of poison and the formation in each State of a Sparrow Commission or a Board of Sparrow Officers—call them what you will—in whose hands the matter could be placed, and who should have the power to use poison under certain restrictions, and encourage the destruction of the nests and eggs at suitable seasons of the year.

The Illinois law recently enacted is better in many respects than either the Ohio or Michigan laws, for the Illinois law provides for the payment of bounties only in the cold months of the year, in December, January and February, so that many innocent birds which otherwise would be killed will doubtless escape, a large majority of the beneficial birds going South in the winter season. The Treasurer of Cook county, Illinois, the county in which Chicago is situated, paid for 12,000 heads during the month of December just passed, and undoubtedly many thousands more will be paid for during the winter; but you can see that the killing even of several hundreds of thousands in the State of Illinois will be of little account in diminishing their numbers. If the money thus expended were applied directly to the preparation and use of poisoned grain while the sparrows were concentrated in the cities in severe weather—if such poisoned grain were properly applied—put before them in the right way and at the right time, after baiting with good grain—an immense diminution would surely follow. It can be done with safety, with economy and with good results, but it must be done with malice aforethought. It must be done with care and in a systematic manner, and there is little doubt that desirable results would be obtained. It is time to take the matter seriously in hand and go at it in a rational way.

One more point should be noted in connection with the payment of bounties on sparrows. So long as the English sparrow occurs in adjoining States, and so long as bounties are paid on the sparrow on one side of the line and not on the other, there can be no guarantee that a State will not pay bounties on sparrows killed outside its lines. There is nothing, in fact, to prevent the killing of sparrows in one State and the collection of bounties on them in the adjoining State.

This, unquestionably, would be done if the bounties offered were large enough to warrant the dishonesty of those desiring to benefit by the law. A small bounty will not be an inducement for the killing of any appreciable number, and a large bounty will lead to dishonesty and draw the birds from all over the adjoining country instead of only from the area aimed at.

This sparrow extermination is but one of the problems on which the Division has been working. The question of the bobolink was undertaken about the same time, and proved to be a problem to which no satisfactory solution has yet been found.

The bobolink, or rice bird—for they are one and the same bird, in the South being known as the rice bird and in the North as the bobolink—this bird causes to the rice-growers of South Carolina and the Gulf States an annual loss of upwards of two millions of dollars. The loss is readily computed, for the area is comparatively small, and the birds exist in immense numbers; the acreage of rice is well known, and we know the amount and value of the product, so that we can arrive at a definite result as to the probable loss from these birds.

This question of the extermination of the rice birds is one of the most difficult problems we have encountered. In the first place, the bird is only injurious while on the rice fields; in the North, as is well known, the rice bird, or bobolink, is a musical bird, a beautiful songster, in every way a positive aid to the agriculturist. It breeds in the clover fields and grass fields of the North, seldom more than half a dozen pairs breeding in the same field, and consequently it is out of the question to kill them at that time, even if the owners of the farms on which they were found would permit their destruction—and they would not. The bobolink is strenuously protected by law in the North, while in the South the rice-growers would be glad to exterminate every one if they could. The only possible thing is to devise some method of keeping them off the rice fields at the time the damage is now done. The fact that these rice fields cannot be entered without excessive damage to the crop; the fact that they are muddy, miry and almost inaccessible, makes it a very difficult question to handle.

Various plans to prevent the damage done by these birds have been devised, but perhaps the most hopeful suggestion made by the Division for getting over the difficulty, is the use of hawks trained to hover over the rice fields and keep the rice birds moving. This sug-

gestion has been made, but the plan has not yet been tried fairly, and its success can only be predicted with a measurable degree of confidence.

The matter of food of hawks and owls and the study of the relation of hawks and owls to the farmers, have been carried on diligently, and but for the expense of publication, there is no doubt we should have given you the full results of our investigations before this.

Hawks and owls have been much maligned and persecuted, and it has been our endeavor to clear their names, where they deserved to be cleared, from the calumny that is hanging over them, and also to put the blame where it belongs. Of the numerous hawks and owls which are found throughout the country, comparatively few are actually injurious to agriculturists. This statement may seem a little strong to many of you, but recent investigations have shown that, as a whole, these birds are beneficial to agriculturists, instead of being detrimental, as alleged. Three-fourths of the food of hawks and owls consists of injurious animals, such as mice, squirrels, rabbits and other small mammals which are oftentimes positively injurious to the farmer.

A few years ago the members of the sportsmen's club in Montgomery county, Maryland, met and agreed that they would kill all the hawks and owls they could, because partridges were diminishing in their vicinity, and it was their belief that the hawks were responsible for the decline in their number. Consequently they made this compact, and published it, with the hope that others would follow their example. The attention of the Department was called to the matter, and we requested that the bodies of the victims be sent to us for examination. We received in this way upwards of 400 hawks in the course of the next two years—all killed in Montgomery county, Maryland, in cold weather, and of course our sportsmen expected to find their anticipations fully realized, and that the stomachs of these hawks would show the remains of a large number of partridges. I think I have the figures showing the results of the examinations of most of these stomachs, and can tell you very nearly the results. It is perhaps sufficient to say, in a general way, that the anticipations of the sportsmen were not realized, and we convinced them, before the end of the first season, that they had made a mistake in killing these hawks. Those sent in were mostly the so-called hen hawks, the red-tailed and red-shouldered hawks, generally supposed to prey largely on poultry and game birds.

There were about 300 of the red-tailed, about 75 of the red-shouldered, and about 50 marsh hawks. Of the red-tails but 7 per cent. contained the remains of poultry or game birds; only 6 per cent. of the marsh hawks contained the remains of game birds and poultry, and of the red shouldered-hawks not one contained any remains of game or of poultry that we could be sure had been taken alive. The red-shouldered hawks in several cases had eaten offal, and in three or four cases parts of fowls, evidently dead before being found by them, were discovered, but in round numbers not over 5 per cent. of all these Maryland hawks had eaten either poultry or game birds. Instead of this we found almost every hawk had mice in his stomach, the red-tails from 3 to 5 field mice, and very little in the way of feathers to indicate that birds of any kind had been eaten. The same was true of the red-shouldered hawk, but there were more squirrels and fewer mice, and occasionally a rabbit. In the marsh hawks rather more birds were found than in either of the other two species. These marsh hawks are very different from the buzzard hawks just mentioned, having longer wings and tails, and feeding largely on meadow mice, frogs and similar food. Of course some species of hawks, E. G. Cooper's hawk and the goshawk, prey largely upon game birds, and the buzzard hawks, particularly the red-tailed, do occasionally visit the poultry-yards. It is always safe, if found hovering over the poultry-yards, to shoot them. If one's dog kills chickens it is safe to kill the dog, but I never heard it advocated to kill all dogs because one particular dog killed chickens. You don't kill all dogs because some of them are sheep-killers. But, if a hawk hovers over the poultry-yard, I would kill him, if possible—it does not make any difference what else he may eat, kill him at once if caught killing chickens. You may have fifty hawks in the vicinity and the chances are they may do no damage, but if a hawk once kills a single chicken he will kill more and I would kill him if I could.

With owls the case is equally interesting; there are fewer of the owls that do any harm, and more of them are positively beneficial, and very markedly beneficial. I will give you a single example: A while ago a member of the division found a pair of barn owls in the tower of a neighboring building, where they had nested and reared and fed their young. The remains of their food lay scattered around the nest. They have the habit of eating anything they like, without regard to how much hard material it contains. They do not chew their food,

and a mouse or rat, whether swallowed whole or torn in pieces, is taken down into the stomach without difficulty ; everything—bones, teeth, hair, feathers, scales and flesh—is swallowed without chewing. Whatever is digestible is soon digested, and the indigestible bones, the skulls, hair, &c., are rolled up into a solid wad, and this ball is choked up, usually coming out in a spherical or cylindrical form, known as a casting or pellet. Hundreds of years ago, when falconry was the rage, a healthy bird could be known by his casting, and these castings are just as characteristic of hawks and owls to-day. We can recognize them wherever we see them, and they are entirely different from the excrement of the birds.

This family of barn owls had been growing for some time, and in an irregular heap about the nest, were deposited their castings. About a peck of them were gathered and softened in water and a careful examination was made of them. There were 200 castings, representing 200 square meals. [Laughter.] Out of these 200 castings we got 452 skulls of animals, and of that number of animals we found 225 were meadow mice, 2 pine mice (a short-tailed mouse similar to the meadow mouse), 179 common house mice, 20 house rats, 6 jumping mice, 20 shrews, 1 star-nosed mole and only one skull of a bird—that of an unfortunate grass-finch, which had fallen a victim to this owl. With the exception of this one skull there was nothing in the food of that family of owls which was in any way objectionable to the interests of the farmer. On the other hand, almost every animal represented by these bones was capable of doing a great deal of injury to the farmer.

A long-eared owl, one of the common small owls, and not a very small one, either, sometimes called the screech owl, was found in the woods in Virginia the same winter, at a place where he had evidently been roosting for some time, and a lot of his castings were collected and examined, and the results were very similar. There were fifty of these castings, and they were found to contain 176 skulls, an average of more than three skulls to each casting. Of these there were 95 meadow mice, 19 pine mice, 15 house mice, 5 white-footed mice, 3 Cooper's mice, (a remarkable find for this part of the country, as it is a species not known in this region before), and there were 26 shrews and 13 birds.

I might go on and give you the results of other examinations, but they would only confirm these statements.

A little as to the method of work in deciding as to the food of

birds may not be uninteresting. It is impossible, of course, for us to put in the field a corps of trained observers, who shall carefully watch the birds, and carefully note every kind of food consumed. Even if it were possible to have such a corps of trained observers, the best of them would be likely to make mistakes in watching the birds. You may see two birds go to a cherry tree and one may be after cherries while the other is after caterpillars, but you cannot always tell this, and in that case the chances are that both would be shot. One bird may be innocent and the other guilty, or both may be guilty or both innocent. It is hard to tell whether a bird is picking up grasshoppers or gravel, whether insects or seeds. You cannot tell by simply watching, but you can take the bird and cut it open, and examine the contents of its stomach, putting the doubtful parts under the microscope, and in this way you can tell what it contains. You will then make no mistake as to what it eats, and if evidence is found which is prejudicial to the farmers' interest, the bird is guilty. He certainly ate what is found in his stomach, whether he intended to or not [laughter], and the chances are that it was food, taken intentionally. There is one disadvantage, and a great disadvantage—you sacrifice a bird every time you take his stomach [laughter], but if the investigation leads to a perfect understanding of the food of that species, and if you know whether it is always injurious or always beneficial, you may afterwards use your gun with discrimination. Anybody can shoot birds, and any one can take the stomach and drop it into alcohol and send it to us, after examining it yourself, if you prefer to do so. We might put ten observers in the field, and so long as they collected no stomachs their observations might not enable us to say anything definite about the food of that particular bird which they have watched. On the other hand, if a few people all over the country are saving the stomachs of the birds they kill, and sending them to us, we may get a collection at the end of the year which will enable us to work up a comprehensive report, and determine with great accuracy the character of the food of such birds. For instance, there is no trouble to get tens of thousands of the stomachs of crows in the winter-time from all over the country, but if you have ever tried to shoot a crow in the summer-time you know the difference. [Laughter.] When you come to examine the food of the crow you realize the difference between it and the food of some of our other common birds. We have examined the food of the crow both in winter and in summer,

but it is very difficult to get stomachs in the summer. During the past summer we have secured for examination the stomachs of several hundred crows, taken in May and June. One lot of 89 young crows fell victims to one small boy [laughter], and another lot of 150 young crows were caught before they left the nests. The stomachs of these young birds are undergoing examination now, and the results thus far show that a crow will take almost anything he can lay his bill or claws on. [Laughter.]

Speaking of the winter roosts of crows and their winter food reminds me of the danger of coming to conclusions on insufficient evidence. It has been said that crows do no damage beyond the damage they do to what they eat. That is, that the food eaten represents the sum total of the damage done by them; that they eat young chickens and pull up corn, but that they also eat injurious insects or grubs and so on. That may be true in the main, but in the winter-time the crow eats some peculiar things. The first time I ever visited a crow roost there was snow on the ground, and there were probably 100,000 crows roosting there every night, and the ground was covered with a deposit which at that time I supposed to be the excrement entirely, but I was mistaken. It was partly formed by the pellets from the mouth of the crow, and the ground was fairly covered with material, some of which I did not recognize at first. It consisted largely of three things—the hulls of Indian corn, undigested; the seeds of the common sumac, and of another seed, which I supposed was a single species, but which afterwards proved to be two, and which I did not recognize. For two years we tried in vain to discover what these seeds were; then one of them was found to be the seed of the common poison oak, or poison ivy. That seed was very numerous. I found with them, however, a smaller number of yellower seeds, and they were the seeds of the poisonous swamp sumac. A pound of this “excrement,” as I supposed, was collected and taken to the laboratory and examined. There were about 4,700 seeds to the pound. This pound was collected from about four square feet of the surface; and there were about fifteen acres covered in this way with this material. By a little computation we find there were a large number of seeds on that roost. [Laughter.] There were enough seeds to sow almost two square miles as thickly as wheat is sown ordinarily. The question then arose whether they would germinate, and after experimenting we found that 90 per cent. of them would grow. Judging

from these results, the crow was going into the business of planting seed on a heavy scale. Of course the ground at the roost was not favorable, but you must remember that the crows are only at the roost in the night-time. We found by experiments on a caged crow fed with poison ivy berries, that the seeds were choked up in about thirty minutes. The digestible material was digested and the indigestible was thrown up in about thirty minutes, and it is reasonable to suppose that the same thing takes place during the day among free crows wherever they happen to be. What they throw up at the roost must be less than half what they throw up during the day, so that if you find poison ivy growing on your farms you need not wonder where it came from, but remember that crows have their planting-time. [Laughter.] Unfortunately, the crows eat these poison berries and so do some other birds, for we have found the same seeds in the stomachs of various other birds. It is simply an intimation of the harm birds may be doing, and of which we have no suspicion; but such an examination of the food of birds makes us careful in determining what damage may be done by them.

We are now making an investigation of the food of the crow blackbird, though the examination as yet is far from complete. We are also working on birds which feed upon the honey-bee, and are studying into the habits of birds which are generally considered to be purely insectivorous; for example, the woodpeckers, flycatchers and various other birds. These investigations are in various stages of progress. We will not feel warranted in publishing the results until enough data have been collected to make us positive in our conclusions. We do not want to characterize a bird as injurious when for hundreds of years he may have borne a good character and has been carefully protected by law. We do not want to charge him with serious offenses of which he may not be guilty.

One point of interest with regard to the cuckoo, a bird which swallows the hairy, spiny caterpillars, which almost all other birds seem to dislike. The cuckoos seem to revel in them, and they swallow the hairiest kind of caterpillars, such as would kill any other bird, but which do not seem to affect them, though it may affect their song, which seems a little off occasionally. [Laughter.] It is a fact that the stomach of the cuckoo is felted with insect hairs, and whether it causes dyspepsia or not I am unable to say; but the entire inner coating of the stomach looks like the top of a silk hat. [Laughter.] The

stomach is completely lined with these hairs, and they are not only on and in the stomach lining, but they run through and through the stomach walls. A cross section shows the hairs sticking out in all directions. It is indeed fortunate for the horticulturist that the cuckoo is blessed with this peculiar appetite for caterpillars, and it is a bird besides which does not seem to be cursed with any bad habits whatever.

I thank you, gentlemen, for your attention, and will close my remarks, as my time has expired.

A unanimous vote of thanks was extended the speakers for the valuable addresses made.

I think it worth while to insert here a short article from Rudolphus Bingham, Esq., of Camden.—SEC'Y. He says: "My anxiety to enlist our people in our valuable little songsters impels me to send a short paper."

BIRDS AS INSECT DESTROYERS.

Believing all ordinary insecticides to be injurious to vegetable as well as animal life, we are forced to the conclusion that the very highest degree of vegetable growth cannot be reached with their use, and have decided to test the more natural remedy for insect pests, the birds. Our first test was in the attic garden, where we have had more trouble than in our other plant-houses, from the fact that a variety of our more tender plants are moved in from the garden well stocked with aphides or plant lice, and that some are so tender that tobacco fumes kill them. The room is 20 x 28 feet, and last fall we planted all, except the portion occupied by the plants from the garden, with lettuce and radishes. We placed in the attic an indigo bird (*Frin-gilla cyanea*), and so far it seems a success. Have seen no lice except on the tender sides of the lettuce leaves when we pulled it. They were where smoke or dust remedies would not have reached them had we used them. Last season we smoked the room twice each week, killed some of the more tender flowers with smoke and lost 20 or 25 per cent. of the radishes from lice. This season we have used no insecticides and had much better crops, the one bird keeping the lice in check, except when the first crop was fully grown we placed a mockingbird in. As it would require so many wire screens for the outdoor houses, which cover 26 x 250 feet, we did not intend to try

birds in them, but the cold weather and snowstorms drove in a few long sparrows (*Fringilla melodia*), a few snow buntings and one winter wren before we had all the glass on, and we have kept them so far, and have used no smoke yet. None of the birds are so tame as to eat in our presence, but the testimony as to their consuming the lice is strongly in their favor. From our experience with birds we deem it practicable to confine them in plant-houses during winter, and to so domesticate our native sparrows, wrens, orioles and other insectivorous birds as to destroy the insects which are so injurious to our gardens and orchards. To that end we should get rid of the pugnacious English sparrows and more thoroughly protect our own native birds.

ADDRESS BY HON. JAS. BUCHANAN.

The Secretary—I understand the electric lights will continue burning for a longer time than usual, and as we have with us the Hon. James Buchanan, we would like to hear a few words from him. Mr. Buchanan kindly volunteered to bring these gentlemen here to-night, and we would like an expression from him.

ADDRESS.

Mr. President and Gentlemen of the Board—I understand at 10 o'clock the light goes out, and so do I. [Laughter.] I did not volunteer to bring these gentlemen from Washington, but the Secretary asked me to do so, and I did it. You insisted upon it, Mr. Secretary, and I told you it would be a pleasure to bring a section of the Department up here, to let the farmers here know what they were doing down there for them. I won't talk to you very long, independent of the light. When a young man upon the farm I always tried to get to bed at nine o'clock, and in my later years I try to get to bed between nine o'clock and the following morning. [Laughter.] While I may not get to bed now by nine, I recognize a number of young gentlemen here who do go to bed at that hour, and I will therefore make my remarks short, so as not to break in on the regular habits of these gentlemen. [Laughter.]

There are one or two things I want to talk to you about. They are matters which intimately concern your interests. There are certain matters of proposed legislation as to which the farmers of the State should speak their minds. You have, I presume, read the bulletins of the Agricultural Department upon the subject of food adulteration. It is a matter of surprise to note the amount of adulteration in foods that is done by unscrupulous men. This is an evil which Congress is trying to remedy by legislation. This legislation

is being bitterly opposed by the interests which will be affected adversely by it. The Oleomargarine bill was only gotten through by the strongest efforts in the House of Representatives. All such legislation is always fought bitterly. There are bills pending looking to the cure of these adulterations, both in the House and in the Senate. Now, if you agriculturists of New Jersey want legislation in favor of pure food, so that only the amount of beef and grain and lard and butter actually produced will be sold, and not extended by adulteration, I want you to say so to your Senators and Representatives. Not that a single one of them, so far as I know, needs that admonition, but that they may use that action of yours in the halls of Congress. The old law of supply and demand regulating price has gone out of date with reference to breadstuffs and provisions, and to-day the price of wheat, corn and beef is fixed, not by the demand, not by the amount produced, not by the consumption, but by the bull and bear factions of the produce exchanges. It is a hard matter to reach by legislation, but attempts are being made to reach it. We have legislation proposed which will make it unlawful for a man to sell a bushel of wheat he never owned, or to buy a bushel of wheat he never expects to own or handle, and with which he only expects to go on the market and gamble, and that at the expense of the farmer. If you want legislation of this kind, to prevent this gambling in futures, say so, and give us the voice of the State Board of Agriculture to lift up in the halls of Congress in behalf of such measures. [Applause.]

There is another measure proposed, which I know will meet in Congress with the most bitter opposition from the gentlemen who think that a dollar expended is a dollar lost. That is the matter of the extension of the free postal delivery to the country districts. The cities have it now, and soon the larger towns will have it, and soon, I believe, these thickly-populated counties will be allowed to have the same privileges which all are taxed to support. [Applause.] I do not believe the people of this country are any the poorer for necessary appropriations honestly expended. I believe the postal system is of great advantage to every community which enjoys it. If it is an advantage to enjoy the free delivery system, I believe that system then should be made as far-reaching as possible, so that all may enjoy it wherever possible. [Applause.] If you are in favor of this extension of free delivery say so to your Senators and Representatives, not for their personal guidance, necessarily, but because I believe

ADDRESS BY HON. JAS. BUCHANAN. 167

your voice will induce others to favor it. Say you want this measure, if you do want it, so that when the vote comes your Representatives can say that the State Board of Agriculture of New Jersey is in favor of the extension of the free delivery system, so that farmers, as well as merchants, may have their letters delivered to them free. [Applause.]

There is another matter, and that is the question of irrigation. The proposition has been made to have the general government go into the irrigation business on an extensive scale, to dam up rivers in the West and use the water for the purpose of irrigating those extensive arid plains west of the one hundredth meridian. I have received during the past two winters a number of letters of remonstrance from New Jersey farmers against the use of the public funds for this purpose. During the past year it has been my good fortune to be enabled to travel over 12,000 miles of this country of ours. In that journey I learned something I did not understand before. I learned that this question of irrigation is, after all, not such a huge question. The number of irrigated acres to be added to the fertile areas will be in proportion small. It will be, after all, a very small percentage compared with the whole country.

This matter is being agitated by the States in which these arid regions lie, and they wish these lands ceded to them in order that they themselves may carry out this project of irrigation. There is one question which will arise to prevent this, I think. Wyoming, for instance, has the headwaters of the Missouri and the Colorado. Now, suppose Wyoming dams up these waters—what will Montana do? what is Colorado going to do? They are already asking themselves this question, and probably nothing whatever will come of the project. I do not mean to say there will be no irrigation, but I mean to say that my fear that there would be a gigantic national project put in operation has been much diminished by an observation of the physical difficulties in the way. I look at another matter with considerable interest and attention, and that is that during my trip I found in Nebraska and California an immense acreage of sugar-beets, and I gathered all the information I could by pertinent, and by almost impertinent inquiries. Out there they are making that crop pay. On my return I went to the Commissioner of Agriculture and asked him if he would furnish beet-seed for trial in New Jersey; he said he would gladly do so for experimental purposes, and not only

this, he would gladly analyze the product ; so that if there is any one here who would like to make a trial, I will see that the seed is sent you, and that the product is analyzed at the Department, if you desire. I mean to say by that, that I will simply be the vehicle through which it may be done. The Department is glad to do this for you. I found in the Pajaro valley, in California, lands which appear admirably adapted to the growth of these beets—a deep, rich loam or muck ; also the same in the valley of the Platte, in Nebraska. I learned that the crop was worth about \$30 an acre after payment of all expenses.

The experiment with these beets is well worth trying, and if you wish to try it, the way is open to you.

I am through now, and the janitor can turn off the light. [Applause.]

The Secretary—With reference to the sugar-beet, it was the intention to have with us a gentleman from New York who is engaged in the manufacture of beet-sugar in the West. I had an extensive correspondence with him during the summer on the subject. New Jersey is adapted to the growth of these beets. The whole State lies within the sugar-beet belt, and I think it will pay us to look well into it. Of course our land is not all suitable, but much of it is well adapted to beet-production.

Mr. Denise—I move that we extend a vote of thanks to the Hon. Mr. Buchanan for his address, and for bringing these gentlemen on from Washington.

Carried.

ADDRESS BY GOVERNOR ABBETT.

The Governor being escorted to the chair by the committee appointed to wait on him, was introduced by President Burrough, who said: I am glad to note the presence of the Governor of New Jersey with us, and it gives me great pleasure to introduce the Governor to this Board. [Applause.]

ADDRESS.

Mr. President and Gentlemen of the State Board—I am pleased to meet this body of representative farmers to-day, because I want the practical assistance of those acquainted with the needs of the agriculturists; I have the disposition to help you, but I have not that accurate knowledge of the subject which you gentlemen are possessed of. Although this is so, I can, perhaps, see difficulties in the way where other interests may be affected, difficulties which may not suggest themselves to you. I believe, however, there is a general feeling throughout the State that the interests of our farmers, so far as legislation can protect them, must be protected; that the people of the State are not only willing but desirous that there shall be proper legislation for this purpose, naturally considering at the same time the interests of others engaged in established industries, even though such industries may not be directly connected with agriculture.

There are some things in relation to agriculture which should receive the assent of every fair-minded man in the State. I am satisfied that the question that is at the basis of all successful agriculture rests upon the ability of the farmer to deliver his products in market at the lowest possible cost. I am satisfied that this can only be done—and I am only giving you my own individual opinion about this—I am satisfied that this can only be done by interposing between the farmer and the common carrier some tribunal that will have the power to hear the grievances of those engaged in transporting agri-

cultural products as well as those engaged in producing them—where both sides can be heard and where there can be a quasi-judicial determination of the rights of the matter.

I am frequently in receipt of letters from different parts of the State giving the grievances of farmers with reference to these high transportation rates, which affect not only the products of the farm but also other articles of freight.

They tell me that in Hunterdon county it costs \$72 to put a car-load of peaches in New York and only about \$26 for a car-load of apples to the same point, and the result is hardly fair to the farmer. In view of the discrimination in freight rates the farmer, for instance, who can raise only a small quantity of produce or a few sheep or a few lambs, must sell to the middleman and cannot deliver to the dealer direct, because he is required to pay such a high rate of freight on a small shipment as compared with a full car-load shipment, thus causing much hardship to the small producer.

These complaints come from all parts of the State, from North Jersey and from South Jersey, and every point in the State where agriculture is the occupation of the people. I can understand that these common carriers must necessarily make some discrimination with reference to these various matters, from the very nature of their business. The man who raises or ships but a small quantity must pay more than he who is a large shipper; but the complaints made are that these discriminations are beyond all reason. The great common carriers say that this is not so; that they must charge such rates as will enable them to make a profit on their business—that they must pay their stockholders a dividend, if possible. They also claim, and perhaps justly so, that they are best able to judge how their business shall be conducted. They are naturally disposed to secure all the business they can handle to advantage, in order that they may be able to pay satisfactory dividends to their stockholders. But that does not satisfy the one who complains, who claims that the corporations should not be constituted the sole judge of what is right and proper. Some satisfactory method should be devised by which both sides can be heard, and a fair rate secured—one that will be just to both sides. I know of no way by which these results can be attained, except by such a tribunal as I have referred to, either to be created or one already created—a tribunal with power to weigh and determine points at issue for both sides in the controversy.

It has been suggested that arbitrary rates be fixed for different commodities from different points. In my judgment it would be impossible to establish such rates as suggested by a general law on this subject. The situation and surroundings are not the same, and the facilities for transportation are not alike in different places. In some places there is competition, and the rates are cut down; in other places certain corporations have the monopoly, and rates are frequently high.

You know what has been the fate of certain measures which have gone before the Legislature, with farmers from certain sections of the State opposing them and those from other sections favoring; some asking the passage of certain bills, while others are opposing their passage. But I do not believe that any fair-minded man should oppose a bill providing for the establishment of a tribunal to try these cases of difference between the producer and carrier. I believe that the creation of such a tribunal would go far towards remedying the present subjects of complaint in regard to high transportation charges.

At the last meeting of the Legislature there was a movement made by farmers—by the agricultural portion of the community—with reference to the equalization of taxation on farm and other property. It is claimed that the taxes on farm property are burdensome, when compared with taxes borne by property in cities and large towns. I recommended to the Legislature and they passed a bill which provided for the creation of a tribunal where these matters could be heard and considered. I am satisfied, and your President is satisfied; that such a tribunal can remedy these evils. This can be done successfully in one part of the State as well as in another, and I believe it can be remedied all over the State. With a tribunal on freight rates, and a tribunal on the equalization of taxation, I am confident the existing evils can be remedied, and it is for you to say whether you want such action taken. I know there is always much criticism on increasing the number of commissions or offices, and it is a fair criticism to make; but when you reach an evil where nothing else will answer as a remedy except the creation of some body with power to hear and remedy complaints—when you reach such a position, and refuse such a remedy for the evil, you place yourselves in the position of growlers with no right to expect a remedy. [Applause.]

There is one subject I wish to allude to—I do not know whether it

comes properly before this body or before some other convention* which is to meet in this city—and that is the question of good roads for farmers. I am in favor of good roads; I don't want good roads for pleasure carriages; I don't want good roads merely for light vehicles; I do not want good roads merely for the sake of local improvement or for those who drive for pleasure alone, but I want to see good roads for the benefit of the farmers of the State. [Applause.] It is the duty of the State, imposed on it by the functions of government, to build good roads. [Applause.] It is true the State gave the municipal authorities—the township committees of townships and the municipal government of cities—the power to build roads and to make certain improvements, but the experience of the farmer has shown that this is not satisfactory. A law remedying this was passed at the last session of the Legislature, but is not complete, because a Commissioner of Agriculture was not provided for as recommended in my message. By this law the State is to assume one-third of the expense of these improvements, provided such total expense shall not exceed \$20,000 per annum to the State, but this amount is not sufficient. I think the State could profitably stand an expense of \$75,000 per annum to help improve the roads. [Applause.]

But, gentlemen, no matter what I may think or what I may recommend, if you want to impress the Legislature you must act as a unit in the matter and not ask too much; you must urge a few cardinal matters only. If you attempt to do everything you will do nothing. The man who wants to reform everything reforms nothing. If you try to do too much you will succeed in nothing. When you want to do too much or when you ask for too much, the Legislature conclude you want the earth and they won't give it to you. [Laughter.] Remedy one evil at a time; unite on one or two things you want and act together as one man. Farmers will live in the State of New Jersey after you, and they will continue to work for remedial legislation in the years to come. Settle now on one or two things you most need, and urge them with one voice and by united effort.

This which I have given you is taken from my practical experience, both as the Executive and as a member of the Legislature, and I know what such bodies are; I know that, if you would secure your ends, you must act as one man, and must not undertake too much at once. [Applause.]

* Reference is made to the State Road Convention called under the auspices of the State Board of Agriculture.—Sec'y.

GOVERNOR ABBETT'S ADDRESS.

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Now, Mr. Chairman and gentlemen, I thank the committee for calling on me, and I thank this Board also for giving me an opportunity to say a few words to them. I must now leave to attend to other State duties. I hope your sessions may result in increased knowledge, and to the advantage of the interests you represent. [Applause.]

The Chair—It is seldom I have had the pleasure of listening to so interesting and instructive an address as that we have just listened to by Governor Abbett. Many suggestions have been made that I would like to see acted on at this session—suggestions that are of vital importance to the farmers of the State.

On motion, a rising vote of thanks was tendered the Governor for his instructive and interesting address.

The Chair—It gives me great pleasure to extend to you, Governor, the thanks of this State Board for your interest in the matters you have mentioned and for the address delivered.

Governor Abbett—I am obliged to you for your expression of good feeling and am sorry I cannot remain longer with you.

NEW JERSEY
STATE AGRICULTURAL SOCIETY.

THIRTY-FOURTH ANNUAL FAIR,

TO BE HELD AT THEIR FAIR GROUNDS AT

WAVERLY PARK, NEWARK,

SEPTEMBER 19, 20, 21, 22 and 23, 1892.

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CORRESPONDING SECRETARY'S REPORT.

To the Stockholders of the State Agricultural Society:

GENTLEMEN—In my annual report to this body two years ago I commenced my report with the following statement of facts: "The year just closed has been phenomenal. It has been unprecedented in many respects, and even the oldest inhabitant remembers nothing like it. Early in the spring everything looked bright and promising for a fruitful and plentiful year. But the bright outlook at planting-time, which raised the hopes of the farmers of the State to a high pitch, signally failed at harvest-time. From an agricultural standpoint, the damages to crops from unprecedented downpours of rain, from the middle of June to the close of the season, can hardly be estimated. During the greater part of the growing season the cultivated ground was kept constantly soaked, preventing the healthy and vigorous growth of vegetables and fruit. Owing to the excessive rains there were thousands of acres of potatoes which hardly paid for harvesting. The crops of peaches, strawberries, blackberries, raspberries and tomatoes were seriously injured by the continued rainstorms; * * * the hay crop, an important one in our State, suffered from the length of time it took to cure it," &c. This was a sad picture and a sad experience for the farmers of our State. When the accounts of the year were closed there were very few who had their balances on the right side of their ledger. The following year, 1890, proved but a trifle less disastrous to the farmers of our State. The peach crop, which has grown to be very large and important in our State, was a total loss, and other varieties of fruit did not yield more than a third of a crop. Late potatoes met with the same fate they did the previous year. The short crops of two successive years of all of the special and staple crops made bad inroads on the ordinary resources of our farmers, and they left lasting and unpleasant recollections. In summarizing the results of the past year (1891) a different tale and a more encouraging one can be pictured. The season of

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1891 will surely be memorable in the history of our State as the most prolific and bountiful, in farm, garden and orchard produce, ever witnessed, even by the oldest inhabitant or closest observer. The season has been unprecedented in the yield in agricultural and horticultural products, and as a result the totals are in excess of any previous year. In fact, the peach crop was so large that it was a burden instead of a benefit to the grower. But this was an exceptional instance, even in this bountiful year.

In 1889 the average yield and value of three staples in our State were as follows:

1889.

CORN.

No. acres.	Yield, bushels.	Value.
357,342	10,729,000.....	\$5,395,864
Average yield, 31.1 bushels.		

WHEAT.

No. acres.	Yield, bushels.	Value.
140,235.....	1,711,000.....	\$1,573,998
Per acre, 13.2 bushels.		

OATS.

No. acres.	Yield, bushels.	Value.
144,425.....	3,408,000	\$1,558,866
Per acre, 26.2 bushels.		

In order that a comparison may be drawn between these two years, I give below the average yield and value of the same three staples grown in our State for 1891, from revised figures kindly furnished me by the Department of Agriculture, Washington, D. C.:

1891.

CORN.

No. acres.	Yield, bushels.	Value.
360,915.....	12,271,110.....	\$8,023,140
Average yield, 34 bushels.		

WHEAT.

No. acres.	Yield, bushels.	Value.
138,883.....	1,944,362.....	\$2,209,111
Average yield, 14 bushels.		

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OATS.

No. acres.	Yield, bushels.	Value.
138,706	3,887,926	\$1,553,507
Average yield, 28.3 bushels.		

In 1889 the total number of acres of these three staples, with their total yields and value, were as follows:

1889.

No. acres.	Yield, bushels.	Value.
357,342 Corn.....	10,729,000	\$5,395,864
140,235 Wheat.....	1,711,000	1,573,998
144,425 Oats	3,408,000.....	1,558,866
<hr/> 642,002	<hr/> 15,848,000 Total.	<hr/> \$8,728,728

1891.

No. acres.	Yield, bushels.	Value.
360,915 Corn.....	12,271,110.....	\$8,023,140
138,883 Wheat.....	1,944,362.....	2,209,111
138,706 Oats	3,887,926.....	1,553,507
<hr/> 638,504	<hr/> 18,103,398 Total.	<hr/> \$11,785,758

In looking over these figures in totals it will be seen at a glance that the number of acres planted in each of the two years are about the same, but the yield is over 3,000,000 bushels more, and the value \$3,000,000 more in 1891 than they were in 1889. This condition is well and fairly explained by the statistician of the Department of Agriculture as follows:

“The returns of the present year are full of encouragement and gratification. The crops of the year, almost without exception, have been large, and naturally some reduction in price must be expected from the prices that prevailed a year ago, following the poor season of 1890. It is too often the case that the decline in values is greater in proportion than the increase in production, the surplus which is produced acting as a powerful factor in depressing the value of the whole crop. The extraordinary demand abroad for our grain this year and the increased consumption at home of other products, which in a measure take the place of those shipped abroad, has resulted in maintaining high values and is a source of gratification that the producing classes are realizing a handsome share in the increment.”

Following as it does the two poor seasons of 1889 and 1890, the season of 1891 has brought some consolation to our farmers and fruit-growers in larger crops and better prices than they expected, taking into consideration the very large crops throughout the country, which, for the surface planted, has not been exceeded in the average yield per acre or in totals. In our own little State, while we have reason to be thankful for the results of last season, still it must strike every intelligent observer that the yield of the staples is far below what it should be with a better system of manuring and tillage in the agricultural districts. We have this fact amply illustrated, this as well as in past years, in the premiums report on farm crops awarded by the State Premium Committee through this Society. For instance, the average yield of corn in the State for 1891 was 34 bushels per acre, while the sworn record of the premium crop is nearly three times that amount. The same is true and proved with wheat, oats and potatoes. The publication of the State premiums in the annual report of the State Board of Agriculture calls attention to these facts and will no doubt have a healthy and beneficial effect on our farmers, showing them what can be accomplished by modern and improved methods in tilling the soil by those who compete for these State premiums, and who represent an intelligent class of our farmers—men who have the confidence and esteem of their neighbors.

The division of the land of New Jersey, according to the last annual report of Hon. J. R. Dodge, United States Statistician, shows that 43.9 per cent. of the total area is good, productive land used for farming purposes, 14.9 per cent. remains in woodland and 2.6 per cent. of the area is unproductive; the balance, 38.6 per cent., is taken up for purposes other than farming. From the same authority we find that from the area used for farm purposes 61 per cent. is under tillage, 10.6 per cent. for pasture and grass lands and 28.4 per cent. in wood and unproductive waste land.

On the 61 per cent. of tillable land in the State the leading cereals occupy considerable area. The acreage under corn averages 73 per cent. to each 1,000 acres of the total land surface of the State, or, in round numbers, 360,915 acres, with an average yield of 34 bushels per acre, making a total crop of 12,271,110 bushels. The wheat crop has an average of 30 per cent. to each 1,000 acres, a total of 138,883 acres, with an average yield of 14 bushels per acre, giving a total yield of 1,944,362 bushels.

The oat crop of the State covered an area of 138,706 acres, yielding an average of 28.3 bushels per acre, or a total of 3,887,926 bushels.

Our State occupies the leading position in the value of land, as compared with the States of the Union. I have arranged a table of the six highest States in this regard, New Jersey leading with an average value of \$65.16 per acre :

Rhode Island.....	\$52 27
Connecticut	49 34
Pennsylvania ..	49 30
Ohio ..	45 97
New York.....	44 41

This table indicates the progress of our State in the agricultural and mechanical arts. It is not alone in the value of the land that we assume a leading position in the ranks of agricultural industry. The relative tables of values of the farm animals of the United States places New Jersey in a prominent and leading position. From the same authority above quoted I find the following average values on farm animals: New Jersey leads on horses, with a value of \$96.21 per head; on sheep also, the value per animal being \$4; on cattle we rank third, the value per head being \$32.57; swine, the value in our State averaging \$9.67, places us fourth.

These figures make no mean showing by comparison with our neighboring and sister States. There is no question but with proper and judicious cultivation the yield per acre for the staples would equal any State in the Union. It seems unnecessary to say that our nearness to the best markets, the value of such crops will range higher than it will in most other localities. In fact, our farmers have a home market for all they produce, and they are independent of monopolies in transporting their produce to market.

It has been one of the main objects of this Society since its organization to foster and aid the farmer's profession and to bring closer together men following the same business, and once a year to treat them to an exhibition of the best products of our State in each and every branch of the husbandman's calling. It is gratifying to know that this and kindred societies in this State have worked in harmony for the accomplishment of improving and bettering our State and our own citizens. That we have been successful more or less goes without saying. The best proof is that more interest is shown in our

annual exhibitions from year to year. Our Society has labored to keep abreast of the times, with the object always in view to have each department well represented and carefully classified. By following this plan from year to year and holding the Superintendents responsible for the careful management of their respective departments, the Society has made the annual exhibitions attractive, instructive and of great interest to the visitors. We believe that this is the true policy, and it goes far to make each exhibition a success. In this same connection it has been the effort of the officers to make it pleasant and agreeable for our exhibitors, giving them such accommodations as they may deem desirable in showing their goods and produce to the best advantage. It has also been the aim of our Society to get such judges as are competent, reliable and impartial in making their awards. It is not an easy task to get seventy or eighty competent judges from different parts of the State to come to Waverly and are willing to serve, doing full justice to the exhibitors as well as to the Society. I am more convinced each succeeding year that reducing the number in each class from three to one is the best policy for both the Society and the exhibitors. When this plan is followed the Society should select an expert and pay him for his services. Another suggestion that I desire to make is that hereafter when the exhibition closes that the Society publish in neat pamphlet form an official list of the premiums awarded, with such commendations as the judges make in their reports. This would entail only a small expense, and it would save trouble and any misunderstanding on the part of exhibitors, who frequently believe they have been awarded premiums when they have not. Speaking of exhibitors, I desire to say here that several of the largest manufacturers of agricultural implements and farm machinery have entered into an agreement not to exhibit their goods at agricultural fairs in the East. This withdrawal on the part of the manufacturers detracts very largely from the interest and value of exhibitions where people expect to see the latest modern improvements and profit by it. Our State and county societies should make some combined effort to again get these manufacturers to show their implements and machinery. With some concerted action on the part of our Society with the different local organizations this may be done; the matter is well worth trying for before our next annual exhibition. I have no doubt but that the Inter-State Fair Association and the county societies will join hands with us in this project, for it will be

for the good of all concerned. It is a pleasant thing to record here that our Society is on the most friendly terms with all of our State and local societies, and it will always be our aim to cultivate and strengthen these friendly relations.

Among other interests in connection with our work coming under my observation, and which has been customary to speak of in presenting this annual review of the year, are the several departments and the manner in which they were arranged and managed at the annual exhibition.

It is gratifying to say that we are making progress yearly from every point of view. The exhibits were more numerous than ever, and the general appearance of the exhibition on the opening day bespoke the excellent character and system in which the exhibitor was received and his or her handiwork displayed.

The show of horses in number and general standard of breeding was in keeping with the character of the exhibition. The leading breeding strains of blooded stock were well represented, and as one of our judges said, "the whole exhibit was a superior one," and one in which he felt honored to have been invited to assist in making the awards.

The stallion classes were well filled, sixteen entries being recorded, including standard trotting, thoroughbred, coach and draft stock. The filly and brood mare classes contained twenty-eight entries and the honors were well contested. In the classes for gentlemen's roadsters, matched and cross-matched teams and family horses, nineteen entries were received. This class the judges found a difficult and trying one; the animals all ranking among the best, combining a high standard of excellence in point of style, speed and action.

The classes throughout were well filled, and in many cases the contest for the "Ribbon" was exciting and lively.

The judges deserve unstinted praise for the thorough and systematic methods employed in performing their difficult task in placing the awards; no complaint has been received, showing, beyond question, that every exhibitor was satisfied with their work, and that a fair and impartial judgment was given on the merits of the animals. Our courteous and gentlemanly Superintendent, Senator Keys, deserves the thanks of our Association for his efforts to make this department a success, and for his general interest in the welfare of the Society, as well as the exhibitors.

The Cattle Department differed somewhat from former years. Our farmers and breeders were not as well represented as one might wish, the bulk of the exhibit coming from adjoining States. This is greatly to be regretted, as our State ranks one of the first in the Union for producing first-class dairy animals, and it would seem that our breeders should take more pride in making the State Fair the annual point at which to meet and contest the honors for superior breeding, as well as to exchange views, and see what advances are being made in this very important branch of husbandry.

It is no small honor to win the State prizes, for, as I am informed by one of our most successful breeders, the animals receiving those prizes will rank with the best at any of our leading shows. The premium card or ribbon of the New Jersey State Society, he assured me, was highly prized by the best breeders, as it is generally conceded at all the leading fairs that the system of judging at "Waverly" was of a high standard and impartial. As I said, the lack of interest shown by our breeders is very much to be regretted, for among the main objects of our State Fair is the one to bring about a broadly, popular competition among our farmers and to reach as many as possible.

I have compiled a table showing the various breeds represented and the number of animals of each that composed the exhibit at our thirty-third annual fair.

TABLE I.

CATTLE.

BREED.	Herds	Bulls.	Cows.	Total.
Jerseys	4	20	39	59
Guernseys	3	17	31	48
Ayrshires	2	12	17	29
Holsteins	1	11	18	29
Herefords	No Prize.	9	16	25
Short Horns	" "	7	15	22
Polled Angus	" "	9	13	22
Brown Swiss	" "	6	12	18
Devons	" "	5	6	11
Dutch Belted	" "	3	8	11
Grades	3	No Prize.	23	23
	13	99	198	297

From the foregoing it will be seen that the favorite Jersey still leads in point of numbers and the handsome Guernsey comes second.

The Jerseys exhibited made a very excellent showing. Among the herds represented were those owned by John O. Magie & Sons, of Elizabeth; Edward Bodee, Freehold; Holly Grove Farm, Plainfield; the Woodburn herd, of Maryland, and the Lackawanna breeders, of Waverly, Pennsylvania.

The competition in the Ayrshire classes was confined to the herds owned by John O. Magie, of Elizabeth, and William Lindsay, of Westfield. The animals comprising these herds are of the best, and we doubt if their equal can be brought together in the country.

The beef breeds, including the Short Horns, the Herefords and Polled Angus, made a most imposing exhibit, being much more numerous shown than has usually been the case; and as they were all in fine show condition the effect of their display was very striking and elicited much praise from the visitors.

The handsome and sleek-coated Devons were few in number, but the herd shown had some grand specimens of that famous breed.

The Brown Swiss, of which so little is known in our country, had a fair representation, some eighteen or more fine animals being shown.

The exhibit of native or grade cattle was not so great in number as formerly. This may be accounted for by the fact that breeders are to a great extent devoting their efforts to procuring only pure-bred stock, realizing that the farmer who takes time by the forelock to improve his stock will be in a position to reap the harvest in good time. Pure-bred stock can be purchased at the present time at more moderate prices than at any time in the past, and our farmers no doubt are improving their opportunity, believing that improved stock enables the farmer to have "improved barns, granaries, meal-rooms and pocket-books." The farmers of America owe lasting gratitude to the breeders, who, by intelligent perseverance, have been able to fix and permanently establish valuable qualities, so that we can rely with certainty on reproducing them.

The Sheep and Swine Departments, presided over by our worthy friend, Mr. Dennis Long, continues to grow not alone in numbers but in point of excellence.

Every breed of importance was well represented, and in saying that the exhibit of sheep at the New Jersey State Fair of 1891 was one of the best in the history of the Society, is saying a good deal.

The breeding of sheep should be more thoroughly considered by our farmers ; a few head can be kept on every arable farm at little or no cost for keep, as the soil of New Jersey is very suitable for the growth of rape, one of the principal fat-producing foods.

The following comparative table will show the various breeds and the number of animals entered in the sheep department :

TABLE II.
SHEEP.

BREED.	Rams.	Ewes.	Total.
Southdowns.....	20	60	80
Cotswolds.....	21	51	72
Shropshires.....	16	51	67
Oxford Downs.....	14	33	47
Merinos.....	19	27	46
Hampshiredowns.....	13	30	43
Leicesters.....	12	15	27
Dorset Horned.....	6	18	24
Lincolns.....	6	9	15
	127	294	421

I have also appended a table of the entries for swine :

TABLE III.
SWINE.

BREED.	Boars.	Sows.	Total.
Chester Whites.....	12	17	29
Poland Chinas.....	10	11	21
Yorkshires.....	8	7	15
Essex.....	7	6	13
Berkshires.....	5	5	10
Cheshires.....	4	5	9
Victorias.....	4	5	9
Jersey Reds.....	4	4	8
	54	60	114

Taken together, this department, from the foregoing tables, can be readily judged as one of the main features of our exhibition, and one deserving especial attention at this time.

The pens provided for this exhibit are in very bad shape and great complaint is made by breeders. Would it not be wise to build new pens upon the lawn, below the cattle stalls, during the coming year, and use the ground at present occupied by the sheep-pens, either for the display of agricultural implements and machines or for the accommodation of carriages and vehicles during the fair ?

The entries of poultry and birds have outgrown our present ample quarters ; over 1,900 coops were exhibited. Some more adequate provision for the accommodation of this feature of our annual exhibition will have to be made, as it is impossible with the present cramped and crowded quarters for the Superintendent to arrange and classify the various breeds. Our Superintendent, Mr. Marshall, worked very energetically, and with good, practical ideas found himself unable to place the exhibit, and the complaints received since the close of the fair from various exhibitors claiming their birds had not been judged, were not due to any error on his part, but rather to his inability to provide room for the proper classification of the exhibits.

The main exhibition building devoted to domestic and home-made articles was the center of attraction from the beginning to the close of the exhibition. The Society is indebted to Mrs. Smith, for her management of this interesting department, which affords pleasure and profit to our visitors. There is possibly no part of the exhibition where the throng of visitors are more numerous than they are in this building.

The art gallery, while yet in its infancy, is assuming larger proportions each succeeding year, and the number of entries surprise those who have charge of this department. The exhibit at the last fair surpassed in numbers and quality any previous show on the Waverly Fair Grounds. The interest that visitors take in this department warrants the Society to make more adequate provisions for it in the future.

TABLE OF ENTRIES FROM 1874 TO 1891,
SHOWING THE STEADY PROGRESS AND GROWTH MADE IN ALL DEPARTMENTS OF EXHIBITS.

DEPARTMENT.	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	EXHIBITS.
Special State	59	70	106	106	148	124	170	146	149	106	155	140	129	126	132	116	136	110	Horses, cattle, sheep, swine.
Speed	52	98	105	99	98	149	.....	103	126	107	66	107	104	175	134	152	147	200	Speed.
Department A.....	107	72	68	73	76	78	109	62	75	46	.....	74	78	88	89	90	106	76	Horses.
Department B.....	392	431	633	715	818	757	950	963	837	845	984	972	1187	1160	1321	1647	1843	2585	Cattle, sheep, swine, poultry.
Department C.....	817	961	1005	1456	1140	1763	1697	1492	1467	1913	1998	2027	1832	1595	2061	1431	1677	2578	Farm products.
Department D.....	548	701	705	1416	946	702	1122	1091	1021	1182	1269	1113	1258	1296	1318	1634	1619	1711	Ladies' needle-work, &c.
Department E.....	164	182	233	256	291	415	540	793	521	477	639	720	818	715	1012	856	904	711	Canned goods, honey, &c.
Department F.....	32	154	139	207	192	263	275	232	207	338	219	321	324	176	219	158	105	90	Farm machines, tools, &c.
Department G.....	69	72	16	40	47	28	49	50	50	57	83	94	64	88	103	95	96	103	Carriages, wagons, &c.
Department H.....	} 29	52	36	37	.....	211	204	86	64	52	57	34	39	35	46	77	73	58	Household furniture, woolen goods.
Department I.....								121	83	85	112	102	110	127	165	111	123	118	Manufactured goods.
Department K.....	97	114	115	136	214	142	177	183	255	300	219	355	380	412	416	435	460	594	Fine arts, &c.
Department L.....	81	97	88	140	159	15	34	72	77	35	60	49	40	39	40	50	.....	.....	Sanitary appliances.
Department M.....	.....	.....	.....	.....	.....	.....	.....	.....	35	16	24	37	39	31	45	52	28	50	Dairy goods.
Total.....	2447	3004	3249	4681	4129	4687	5491	5394	4967	5559	5885	6184	6296	6063	7140	6904	7317	8984	

The past season, 1891, will be memorable for the bountiful production of farm, garden and orchard products. No better testimony need be given of this fact than examination of the products of the soil of our State, arranged on the tables in the horticultural tent at Waverly in September last. It showed at a glance that the exhibition was unusual in size and superior in all its parts and in the quality of the products. The show of cereals, vegetables and fruits was a credit to the growers, and well worthy any State in this Union. The display of fruit was without question the largest and finest of any held at any time on the Atlantic seaboard, either in variety, quality or numbers. The show of apples, pears, peaches and grapes went far ahead of any previous exhibition held on our grounds, and it attracted marked attention and sincere interest from experts in the profession. The show of green and hot-house plants was of a superior quality, both in numbers and high standard of the plants. The exhibition in this special department was creditable alike to the exhibitors and the Society. Taking it as a whole it was worthy of the highest commendation, and it gave great pleasure to the thousands of visitors to the State Fair of 1891.

Before closing this brief summary of the exhibition of last year, it would be remiss on my part if I did not mention the fact that the success of the fair was largely due to the energy, ability and untiring efforts of our efficient President, Mr. H. H. Isham. He was ably seconded in this work by Mr. E. B. Gaddis, the General Superintendent of the grounds, who spared neither time nor labor in performing his multiplicity of duties before and during the fair week. It is but justice to mention here that the Executive Committee worked faithfully and harmoniously, giving both time and mature judgment in discharging the various duties devolving upon them in the preparations for the exhibition. They are well worthy of the warm thanks of the stockholders of this Society. The exhibition as a whole was a great success, and certainly was a credit to the State and managers of this Society.

It is said, and truly so, that he is a public benefactor who makes two blades of grass grow where one grew before. This Society has labored for this principle, and its labor has been rewarded.

P. T. QUINN,

Cor. Secretary.

TRENTON, January 20th, 1892.

SPECIAL STATE PREMIUMS

FOR THE YEAR 1891.

List of awards made at the Thirty-third Annual New Jersey State Fair of the New Jersey State Agricultural Society, held at Waverly Park, September 21st, 22d, 23d, 24th and 25th, 1891.

HORSES.

STALLIONS.

	First Premium.	Second Premium.
Flemington Stock Farm, Flemington.		
Standard-Bred Stallion "Cypress," with two of his get, \$100 00		
Woodruff & Rosencrans, Newton.		
Standard-Bred Stallion "Nutcoast," four years old.....	60 00	
W. W. Pursell, White House.		
Standard-Bred Stallion "Redington Prince," four years old		\$ 0 00
Palisade Stock Farm, Closter.		
Standard-Bred Stallion "Ettrick," three years old.....	50 00	

BROOD MARES, ETC.

Raritana Stock Farm, Raritan.		
Standard Brood Mare "Ella Deane," with colts.....	75 00	
Flemington Stock Farm, Flemington.		
Standard Brood Mare "Olive," with colts.....		40 00
Standard-Bred Filly "Edith Ray," three years old.....	50 00	
Standard-Bred Filly "Rena Howell," three years old..		25 00
Raritana Stock Farm, Raritan.		
Standard-Bred Filly "Sunset," two years old..	40 00	
Flemington Stock Farm, Flemington.		
Standard-Bred Filly "Miss Rena," two years old.....		20 00

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THOROUGHBRED STALLIONS.

	First Premium.	Second Premium.
Andrew Castles, Newark.		
Thoroughbred Stallion, with get.....	\$75 00	
Wm. Howard, Orange.		
Thoroughbred Stallion "Okalona," with get.....		\$40 00

CARRIAGE AND COACH HORSES.

Their Best Qualities Considered for Breeding.

Tranquillity Stock Farms, Allamuchy.		
Stallion "Red Fox," with get.....	75 00	
Brood Mare "Belmont," with foal.....	60 00	

PERCHERONS AND CLYDESDALES.

M. W. Baney & Bro., Newark.		
Stallion, with one of his get.....	75 00	
Tranquillity Stock Farms, Allamuchy.		
Brood Mare and foal.....	60 00	
G. Krueger, Newark.		
Brood Mare and foal.....		30 00

L. V. D. SHEPPARD, Bound Brook,
J. W. HAWK, Newark,
J. F. SEBRING, Newark,
Judges.

CATTLE.

BEST HERD OF AYRSHIRES.

J. O. Magie & Sons, Elizabeth.		
Bull "King Drummond" and four cows.....	\$100 00	
Wm. Lindsay, Elizabeth.		
Bull "Sir Drummond" and four cows.....		\$50 00

BEST BULL TWO YEARS AND OVER.

Wm. Lindsay.		
Bull "Sir Drummond".....		25 00
J. O. Magie & Son.		
Bull "King Drummond".....	50 00	

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COW OVER TWO YEARS.

	First Premium.	Second Premium.
Wm. Lindsay.		
" Lady Belle ".....	\$50 00	
J. O. Magie & Son.		
" Mary Gold 3d ".....		\$25 00

D. W. MATTESON, Edmeston, N. Y.,
DUDLEY WELLS, Wethersfield, Conn.,

Judges.

HOLSTEINS.

Best Herd, One Bull and Four Cows.

Wagener Stock Farm, Hackettstown.		
Bull "Netherland Artis Prince" and four cows.....		\$50 00

BEST BULL.

D. B. Wade, Union.		
Bull "Shafto Pruyn," two years old.....	\$50 00	
D. T. Magie, Elizabeth.		
Bull "Lileths, &c.".....		25 00

COWS.

Chas. R. Hoff, Centreville.		
Cow "Eke 2d".....	50 00	
Wagener Stock Farm, Hackettstown.		
" Netherland Belle Isle 2d ".....		25 00

H. LANGWORTHY, West Edmeston, N. Y.,
H. C. GALE, Tivoli, Conn.,

Judges.

GUERNSEYS.

Best Herd.

Geo. La Monte, Bound Brook.		
Bull "Sir Garis" and four cows.....	\$100 00	
Wm. Lindsay, Westfield.		
Bull "Taxpayer" and four cows.....		\$50 00

BULLS.

Wm. H. Du Bois, Marlboro.		
" Taurus of Marlboro ".....	50 00	
Geo. La Monte.		
" Sir Garis ".....		25 00

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COWS.

	First Premium.	Second Premium.
Geo. La Monte.		
"Little Nell of Evergreens"	\$50 00	
Wm. Lindsay.		
"Pearl of Beverly"		\$25 00

DR. L. M. LUSSON, Ellmore, Pa.,
E. H. POMEROY, New Castle, Del.,
Judges.

JERSEYS.

Best Herd.

J. O. Magie & Son, Elizabeth.		
Bull "Majestic Riotor" and four cows.....	\$100 00	
Holly Grove Farm, Plainfield.		
Bull "Prize Le Brocq" and four cows		\$50 00

BULLS.

J. O. Magie & Son.		
"Majestic Riotor"	50 00	
Holly Grove Farm.		
"Prize Le Brocq"		25 00

COWS.

J. O. Magie & Sons.		
"Montanio"	50 00	
Holly Grove Farm.		
"Vitresse 3d"		25 00

E. H. ROBINS, Wethersfield, Conn.,
DR. L. M. LUSSON, Ellmore, Pa.,
J. P. HUTCHINSON, Bordentown, N. J.,
Judges.

GRADES.

Best Herd Thoroughbred Bull and Four Grade Cows.

Wm. Lindsay, Westfield.		
Guernsey Bull and four grade cows.....	\$100 00	
D. T. Magie, Elizabeth.		
Holstein Bull and four grade cows		\$50 00

COWS.

	First Premium.	Second Premium.
D. T. Magie.		
Grade Cow "Queen".....	\$50 00	
Wm. Lindsay.		
Grade Cow "Hyblunt".....		\$25 00

DR. M. H. C. VAIL, Newark,
L. DAVENPORT, New Foundland,
H. M. CULBERSON, East Orange,
Judges.

SHEEP.

DORSET HORNED.

Tranquillity Stock Farms, Allamuchy.		
Dorset Horned Ram, over two years old.....	\$20 00	
Pen of one Dorset Horned Ram and two Ewes.....	20 00	

SHROPSHIRE.

Tranquillity Stock Farms, Allamuchy.		
Ram over two years old.....	20 00	
Benj. Hulse, Allentown.		
Ram, over two years old.....		\$10 00
Tranquillity Stock Farm.		
Pen of one Ram and two Ewes.....	20 00	

OXFORDS.

J. McCain, Mt. Hermon.		
Ram, two years old.....	20 00	
Wm. C. Addis, Delaware.		
Ram, over two years old.....		10 00
Benj. Hulse.		
Pen of one Ram and two Ewes.....	20 00	

COTSWOLDS.

Tranquillity Stock Farm.		
Ram, over two years.....	20 00	
Pen of one Ram and two Ewes.....	20 00	
Wm. C. Addis.		
Ram, over two years old.....		10 00

LEICESTERS.

Tranquillity Stock Farms.		
Ram, two years and over.....	20 00	
Benj. Hulse.		
Ram, two years and over.....		10 00

STATE BOARD OF AGRICULTURE.

SOUTHDOWNS.

	First Premium.	Second Premium.
Benj. Hulse.		
Ram, two years old.....	\$20 00	
Pen of one Ram and two Ewes.....	20 00	
Wm. C. Addis.		
Pen of one Ram and two Ewes.....		\$10 00

MERINOS.

J. McCain, Mt. Hermon.		
Merino Ram.....	20 00	
Pen of Merinos.....	20 00	
Benj. Hulse, Allentown.		
Merino Ram.....		10 00

R. P. POMEROY, Del.,
J. M. PECK, Hornellsville, N. Y.,
H. ROBERTS, Fellowship, N. J.,
Judges.

SWINE.

Wm. C. Addis, Delaware.		
Jersey Red Boar.....	\$20 00	
Poland China Boar.....	20 00	
Benj. Hulse, Allentown.		
Small White Boar.....	20 00	
Wm. Lindsay, Westfield.		
Small White Boar.....		\$10 00
Chas. R. Hoff, Centreville.		
Cheshire Boar.....	20 00	
Benj. Hulse, Allentown.		
Large White Boar.....	20 00	
Essex Boar.....	20 00	
Wm. Lindsay.		
Essex Boar.....		10 00

SWEEPSTAKE.

For the Best Boar Among the Prize-Winners, All Breeds Competing.

Benj. Hulse.		
Large White Boar.....	\$20 00	
Wm. C. Addis.		
Poland China Boar.....		10 00

WILLS A. SEWARD, Budds Lake, N. J.,
R. D. BUTTON, Cotton, N. Y.,
Judges.

POULTRY.

	First Premium.	Second Premium.
John C. Hayne, Annandale.		
For the Best Display.....	\$50 00	
Chas. A. Reid, Englishtown.		
Second Best Display		\$25 00
J. H. DREVENSTEAD, Judge.		

TRENTON, Jan. 19th, 1892.

Your State Premium Committee would report the following persons and crops as a true return of the awards made by them for the year 1891, on farm crops, as follows :

FARM PRODUCTS.

WHEAT.—First Premium to John H. Denise, Monmouth county\$25 00

Soil, clay loam. Wheat sown after potatoes. One and one-quarter bushels of seed per acre was drilled in, with 500 pounds of home-made chemical mixture, October 1st. One hundred and fifty pounds nitrate of soda was applied March 25th. (Formula of fertilizer for wheat, 800 pounds bone meal, 200 pounds nitrate of soda, 400 pounds bone black, 600 pounds potash.) Five hundred pounds of this mixture was applied in the fall, at time of seeding. Variety, Poole wheat—yield, 182 $\frac{1}{2}$ bushels, or 36 $\frac{3}{4}$ bushels per acre, mostly sold for seed at \$1.10 per bushel, equal to \$200.47. Expense—Seed, 6 $\frac{1}{2}$ bushels, \$1.50, \$9.37; harvesting and threshing, \$54; fertilizing and sowing, \$55.45; total expense, \$118.82, or \$16.33 net per acre.

WHEAT.—Second Premium to David L. Ballinger, Burlington county.. 15 00

Soil, loam. Seven pecks of seed to the acre was sown October 4th, after plowing and harrowing a fallow of tomato vines and beans. No fertilizer or manure on this crop. Yield, 25 bushels per acre. Sold at mill near by at \$1.05 per bushel. Total receipts, \$131.25. Expense, 6 cents per bushel for threshing; \$7.50 in all.

RYE (5 acres).—First premium to D. Augustus Vandever, Monmouth county..... 25 00

Sowed broadcast, by hand, on corn ground, one bushel of seed per acre, harrowed in with wheel-harrow and rolled; no fertilizer used; yield, 108 bushels, or 21 $\frac{3}{4}$ bushels per acre. Sold at mill near farm at 95 cents per bushel. Receipts from sales, \$102.60. Straw not yet sold.

CORN (5 acres).—First Premium to John H. Denise, Monmouth county.....\$25 00

Soil, clay loam; sod covered before plowing with yard manure, 12 loads per acre, planted in hills 4 by 4 feet, 3 spears to hill left to grow; level cultivation, by using Breed's weeder both ways for first operation, then with Gang cultivator both ways; third, 2 horses were used to a strong nine-tooth, narrow-blade cultivator, running 6 inches deep, working both ways. After-cultivation from 2 to 3 inches deep, as to growth of corn. Fertilizers used, 500 pounds home-mixed chemicals, with a little dried ground fish in the hill for a starter. Corn weighed at husking, 75 pounds per bushel; had been cut and stacked and was fairly dry. Yield of 5 acres, 472½ bushels; per acre, 94½ bushels. Expense—60 loads manure, \$1.50, \$90; chemicals, \$51.50; work of planting and tending, \$72; total, \$213.50. Receipts—472½ bushels at 60 cents, \$283.50. Stalks will pay for harvesting.

CORN (5 acres).—Second Premium to Roland Conrow, Burlington county..... 15 00

Soil, loam; timothy sod plowed in March about 7 inches deep, planted May 14th and 15th, in hill 4 feet by 4 feet 4 inches. Crop greatly damaged by storms. Corn weighed at time of cribbing and was in fair condition as to dryness. Fertilizers—About 1,000 pounds hen manure per acre placed in the hill at time of planting. Yield from 5 acres, 409¾ bushels and 10¼ tons stalks; average per acre, 81¾ bushels and 2¼ tons stalks. Variety, cross between Yellow Dent and Gourd; frequent and level cultivation.

TIMOTHY HAY (5 acres).—First Premium to John H. Denise, Monmouth county..... 25 00

Soil, heavy clay. Laid down to grass after wheat. Land, previous to wheat crop, had been highly fertilized for corn and wheat. Seeded to clover and timothy at time of wheat-seeding. This crop second year's cutting and not pastured after first year's mowing. Three hundred pounds nitrate of soda per acre applied about May 1st, on a damp day. Approve of the late date, as the crop takes up the material sooner. Yield, 14 tons 11 hundredweight, or 2 tons 1,820 pounds per acre. Sold at building at \$14 per ton, November 20th. Expenses—Nitrate of soda, \$37; harvesting 14½ tons, \$2.50 per ton, \$36.25; total, \$73.25. Receipts from sales, \$203.70. Net total, \$26.09 per acre.

WHITE POTATOES (1 acre).—First Premium to John H. Denise, Monmouth county..... 25 00

Soil clay loam, with stiff subsoil. Planted on stiff timothy sod that had been mowed for 6 consecutive years and had been

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treated with fertilizing material 4 of the 6 years. Planted 3 inches deep in drills 1 foot distant by 2 feet 9 inches. Soil nicely fined before planting. Cultivation as nearly level as possible until time to cover tubers from action of hot sun. Home-mixed fertilizer made from high-grade chemicals was applied—1,400 pounds per acre, 1,000 pounds at time of planting and 400 pounds when potatoes were 6 inches high. Yield from 5 acres, 684 barrels prime and 11 barrels culls, equal to 705 barrels, or 141 barrels per acre. Shipped to New York at digging-time and sold 684 barrels. Average sales, \$1.60 per barrel, amounting to \$1,094. Expenses—Seed, \$62.50; fertilizers, \$116; plowing and cultivating, \$66.50; digging, \$70; carting, \$41.50; Paris green and lime, \$11; marketing, \$278.60; total, \$644.60; net total per acre, \$89.88.

WHITE POTATOES (1 acre).—Second Premium to Henry Campbell,
Monmouth county.....\$15 00

Soil, clay loam. Plowed April 10th to 15th. Planted April 20th. Variety, Rural, No. 2. Planted 2 feet 6 inches by 1 foot apart in the row. Planted with Aspinwall planter. About the time of covering, plowed under with one-horse plow and harrowed down level. Cultivated with Iron Age cultivator three times; hoed once. Applied 1 ton Stockbridge potato manure, drilling 1,400 pounds broadcast and 600 pounds in drill at planting; 15 tons horse manure broadcast, and turned under at time of plowing the ground. Yield, 221 barrels. Marketed August 20th and shipped to New York and sold for—215 barrels at \$1.50, \$322.50; 6 barrels culls at 75 cents, \$4.50; total receipts, \$324.75. Expenses—1 ton fertilizer, \$38; 15 loads manure, \$2.50, \$37.50; plowing ground, \$2; harrowing, 50 cents; cultivating, \$6; hoeing, \$2; digging, \$22; cartage, \$4; 3 barrels seed, \$12; total, \$124.

SWEET POTATOES (1 acre).—First Premium to Nathan H. Conrow,
Burlington county..... 25 00

Soil, sandy loam; seed potatoes put into a furnace hot-bed about April 6th. May 17th and 18th the plants were set in the field in rows 4 feet apart and 20 inches apart, in the row; ridges were made up as high as possible, and kept so all the season; plowed twice, scratch-harrowed once; hoed three times; dug October 12th and 15th and put in potato-house, where they are at this date, December 26th, 1891. Stable manure, well rotted, was applied. About 1,000 pounds to 400 plants. Yield, 612 baskets, $\frac{3}{4}$ -bushel size. Crop will be marketed during January and February. Estimated value now 25 cents a basket.

SWEET POTATOES (1 acre).—Second Premium to David L. Ballenger,
Burlington county.....\$15 00

Soil, sandy. After plowing in spring, opened furrows 3 feet 9 inches apart. Spread a light coat of manure in the rows. Set plants 14 inches apart in rows; plowed twice, hoed twice; cultivated once. Applied 600 pounds Grange fertilizer per acre. Yield, 325 baskets.

EARLY CABBAGE (1 acre).—First Premium to Theodore F. D. Baker,
Cumberland county 25 00

Soil, sandy loam; good clay subsoil, and has been cultivated to onions continuously for ten years, with applications of fertilizers only. Variety, Jersey Wakefield. Plants were wintered in cold frame. Set March 19th, on slight ridges 3 feet apart, and plants 2 feet in the row, requiring about 7,200 plants for the acre. Cultivated often and thoroughly with hoe harrow; plowed once; wheel-hoed twice with double-wheel hoe. Cut first basket May 27th; finished cutting July 2d. Fertilizers and manure—25 loads of yard manure was applied in the winter of 1890 to a plowed surface. Again plowed in spring of 1891, and 1,600 pounds of fertilizer applied broadcast and 400 pounds in the row before setting the plants. Brand, Trucker's Pride, manufactured by Garrison & Minch, Bridgeton; 100 pounds of nitrate of soda was applied on the rows after plants were well established. Yield, 588 baskets, 20 barrels and 393 heads. Marketing, 6 baskets at \$1; 11 baskets, at 90 cents; 6 baskets at 80 cents; 25 baskets at 75 cents; 21 baskets at 60 cents; 186 baskets at 50 cents; 141 baskets at 40 cents; 122 baskets at 30 cents; 70 baskets at 25 cents; 3 heads at 5 cents; 390 heads at 3 cents; 10 barrels, 2 at \$1.25, 8 at \$1; 10 barrels at 60 cents; all sold in home market but the 20 barrels, which were shipped to Philadelphia. Total receipts from sales, \$267.25. Statement of expenses—Commission, \$1.65; freight, \$3; cartage, \$2; interest on land, \$7.50; fertilizer, 1 ton, \$35; manure, \$1.50 per load, \$37.50; 100 pounds nitrate soda, \$2.67; plowing and cultivation, \$10.50. Total, \$99.82. Net proceeds, \$167.43.

EARLY CABBAGE (1 acre).—Second Premium to Charles B. Jessup,
Burlington county..... 15 00

Soil, a free loam. Variety, Early Jersey Wakefield Cabbage. Set in rows 3½ feet apart the first week in April, and kept well cultivated without plowing. About 800 pounds of Grange fertilizer put in the rows before they were made up, and a light coat of manure spread on the land the winter before. There were 299 baskets cut off the piece. They were sold in Philadelphia market and were all off by the first week in July. Expenses—The

expense was in plowing, making it up, the fertilizer and the labor in marketing. From the acre was received \$104.80, averaging 35 cents per basket.

TOMATOES (1 acre.)—First Premium to L. Du Bois, Monmouth county, \$25 00

Soil, clay loam. Land in sod. Been pastured 4 years. Plowed last week in March. Wheel-harrowed once, drag-harrowed twice. Furrowed 4 feet 4 inches each way and plants set in bottom of furrows May 25th and 26th. Cultivated 4 times with one-horse cultivator. First picked August 19th; last, October 19th. Fertilizer, fine horse manure and night-soil spread on part of plot, rest had no fertilizer. Yield from $4\frac{577}{1000}$ acres was 168,253 pounds, or 36,760 pounds per acre—18 tons 760 pounds. Sold all but 17 crates to canning factory at Freehold at \$7.25 per ton. Amount, \$133.25 per acre. Expense, plants worth \$2 per 1,000. Picking, \$1 per ton.

TOMATOES (1 acre.)—Second Premium to David L. Ballenger, Burlington county..... 15 00

Soil, sandy loam. Plants started in hot-bed; set out about middle of May. Cultivated both ways twice. Plowed twice. Manured in row and set plants 4 feet 3 inches by 5 feet. Used 800 pounds Grange phosphate under the manure. Yield, 784 baskets, of which 100 were sold in town before the factory started; the rest to the factory at \$7.50 per ton. All cleared $14\frac{1}{2}$ cents per basket. Total receipts, \$113.68.

ONIONS (1 acre.)—First Premium to Theo. F. D. Baker, Cumberland county 25 00

Soil, good, sandy loam, with a red clay subsoil. Has been cultivated to onions for 10 years continuously without barn-yard manure or stable manure. Onions grown from sets. Commenced planting the sets March 27th, 1891; finished March 31st. Rows 14 inches apart and 3 inches apart in the rows, which are 20 rods long, 113 rows per acre. Cultivated with Allen's double-wheeled hoe three times. Hand-weeded once. Harvested with Allen's onion harvester attached to wheel-hoe. Applied 1,600 pounds of Trucker's Pride fertilizer broadcast and harrowed in thoroughly. Yield was 99 barrels prime, $53\frac{1}{2}$ baskets seconds. Marketing—Sold in New York and Philadelphia through commission men as follows: Sixteen barrels at \$5, 15 barrels at \$4.50, 7 barrels at \$4, 2 barrels at \$3.75, 3 barrels at \$3.50, 27 barrels at \$2.50, 11 barrels at \$2.25, 7 barrels at \$2, 53 baskets at 25 cents, 8 barrels not yet returned for. Total receipts, \$321.25, and 8 barrels to hear from. Statement of expenses—Freight, \$22.75; cartage, \$9.10; commission, \$32.12; 12 bushels sets, \$36; 1,600 pounds fer-

tilizer, \$28; plowing and harrowing, \$3.50; hoeing, \$4.50; weeding, \$10; harvesting and setting, \$21.38; interest on land, \$7.50. Total, \$174.85 net.

ASPARAGUS (1 acre).—First Premium to John and Joseph Quinn,
Essex county.....\$25 00

Soil, light clay; part loam, part heavy. Bed 5 years planted; third cutting; planted in rows 3 feet between and 18 inches apart in rows. The ground is plowed after rubbish is cut and cleared off in the fall. In spring the rows are cultivated level and hoed twice; cultivated once while cutting; plowed, hoed and cultivated again after cutting; commenced cutting April 24th, and stopped June 22d. Forty-five two-horse loads of stable manure to the acre was applied. Yield, 150 dozen bunches; average, 4 pounds per bunch; stalks cut 10 inches long; total, 7,200 pounds; sold through commission merchants in Newark. Expenses—Manure, \$45; cultivating, \$5; plowing, \$3; hoeing, \$5; cutting and bunching, \$64; commission, \$32.94; total, \$154.94. Total receipts from sales, \$329.40; about \$2.20 per dozen bunches.

ASPARAGUS (1 acre).—Second Premium to Charles B. Jessup, Burling-
ton county..... 15 00

Soil, sandy loam, with clay subsoil. The trash was cleared off in the spring and the ground harrowed. After the bed had been cut a few times, a ridge was thrown on the rows, this being all the cultivation. Fertilizer—About 500 pounds per acre of Grange fertilizer, spread on the bed in the spring after the trash was removed. Yield, 2,031 pounds. Marketing—The first few cuttings were sent to Philadelphia, two-pound bunches averaging 10 cents; after that, sent to the factory at 5 cents per pound, cut 7 inches long. Total receipts, \$101.65. Expenses were in clearing off the trash in the spring and in cutting four times a week.

FRUIT PRODUCT.

PEACHES (1 acre).—First Premium to John and Jos. J. Quinn, Essex
county 25 00

Soil, heavy clay. Orchard planted on hillside. Variety, Morris' White and Crawford's Late. Trees planted in 1889 in rows 15 feet apart, 121 trees to the acre. Ground plowed early in spring, cultivated twice and hoed once. During the growing season was horse-hoed and cultivated. Horse manure spread broadcast, about 10 two-horse loads to the acre, and about 200 pounds of Mapes' vine manure when cultivated. Yield, 241 peach-baskets, or 120½ bushels, which was loaded on truck at

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the farm and delivered to commission merchant in Newark. Expenses—Cultivating, \$3; hoeing, \$2; manure is counted in cost of raspberries, which are planted between the rows; 200 pounds Mapes' manure, \$4; picking, \$10; commission, \$18.48; total, \$37.48. Total receipts from sales, \$184.80.

PEARS (1 acre)—First Premium to Henry Campbell, Monmouth county.....\$25 00

Soil, clay loam. Variety, Keiffer pear. The orchard is kept cultivated and manured with horse manure in the fall and Stock-bridge potato manure in the spring at the rate of 2,000 pounds per acre, at intervals; part applied first of April, balance about middle of June—134 trees. Yield, 405 barrels. Marketed in barrels and shipped to New York, and sold for \$2.50 per barrel for the large and \$1.25 for the seconds. Total sales, \$997.50. Expense picking and commission, \$354.37. Net, \$643.13.

PEARS (1 acre).—Second Premium to Jacob B. Conover, Monmouth county..... 15 00

Soil, clay loam. Variety, Bartlett pears. Orchard seeded to clover 3 years ago in the autumn. Mowed each year since in the middle of June and left as a mulch on the ground. Afterwards pastured with hogs, though not very close. Fertilized 2 years ago with Coe's fruit fertilizer, at the rate of 500 pounds to the acre. Yield, 650 bushels. Marketed in New York, Boston and Portland. Fifty bushels fed to the hogs. Statement of expenses—New barrels, \$78; commission, New York, Portland, 10 per cent., Boston, 8 per cent., \$63.50; freight and cartage, \$76.68; total, \$218.17. Receipts from commission-men, \$646.49; 50 bushels to hogs, 10 cents, \$5. Total value, \$651.49. Net, \$433.32.

APPLES (1 acre).—First Premium to Henry Campbell, Monmouth county..... 25 00

Soil, clay loam with clover and timothy sod. Variety, Fall Orange. There were 48 trees set out on the acre, 4 having died, leaving 44 trees. Yield, 440 barrels of merchantable apples and 220 bushels cider apples. The orchard was spread with hog manure, at the rate of 10 loads per acre, about the 1st of June. Marketing—440 barrels merchantable apples shipped to New York, at \$1.50, \$660; 220 bushels cider apples, 10 cents, \$22. Total sales, \$682. Expenses—Picking, barrels, transportation and commission on 440 barrels, at 75 cents per barrel, \$330. Net receipts, \$352.

APPLES (1 acre).—Second Premium to Horace B. Lippincott, Burlington county.. 15 00

Soil, sandy loam with stiff clay about 2 feet below surface. Manured and farmed each year since the orchard was put out—

part in 1868, balance in 1869. Have heretofore cultivated the orchard with crops. This year, when the weeds were 2 feet high, plowed them under and harrowed the ground. For 5 or 6 years previous have raised corn fodder. Sprayed just after bloom left. Remarks—Not being able to keep one acre separate I give the proceeds of whole orchard—1 acre, 3 roods, 18 perches. I was obliged to shake off 150 baskets when apples were half size to save the trees. Yield—Sold 1,481 baskets, 9 bushels and 7 barrels; ground for cider, 900 baskets; have in cellar, 180 baskets; total, 2,614 baskets. Retail by basket in Trenton, Mount Holly and Burlington. Can make no statement of expenses, as in Burlington and Trenton the wagon always carried other products. Sales—1,481 baskets, \$326.82; 9 bushels, \$5.25; 7 barrels, \$14; total, \$346.07; with 1,500 gallons cider for vinegar and 180 baskets on hand, from 1 acre, 3 roods and 18 perches.

GRAPES (1 acre).—First Premium to D. Augustus Vandever, Monmouth county..... \$25 00

Vineyard 165 feet above sea-level. Soil, heavy clay loam. Natural drainage, a little inclined to south. Variety, Niagara; planted 10 by 10 feet each way; trained on the Kniffin system—2 wires, $3\frac{1}{2}$ and $5\frac{1}{2}$ feet from the ground. Plowed early in spring, 3 inches deep, from the vines; plowed again, to the vines, same depth, then used the cultivator two or three times and kept clean until after harvest. Fertilized with marl principally, 20 tons per acre, dug on the farm; have used bone and ashes with good results. Yield, 8,317 pounds. Sold in New York, Newark and Freehold in crates of 40 pounds each, containing 8 baskets of 5 pounds each. Expense—Freight and commission, \$77.73. Total receipts from sales, \$277.86.

GRAPES (1 acre).—Second Premium to Asher B. Rue, Middlesex county..... 15 00

Soil, clay loam, lying nearly level; variety, Concord. The vines are 9 feet each way, trained in rows to 3 wires, attached to posts 7 feet high; kept clean by plowing, hoeing and harrowing; sprayed twice early with Bordeaux mixture and later ammoniacal solution. No manure applied since 1888; crop destroyed by rot in 1889 and 1890. Yield, 7,752 pounds. Fruit was carefully trimmed and packed in boxes, choice for table use, 20 to 30 pounds each, and sold to first-class grocers and fruit dealers in the city of New Brunswick. Statement of expenses—Pruning, raking and tying, \$10; plowing, \$4; hoeing, \$3; harrowing, \$4; spraying, \$12; cutting and packing, \$35; marketing, \$32; total, \$100. Sales—7,459 pounds fine grapes for table use sold for \$245.23; 293 pounds grapes for wine, \$5.12. Total receipts, \$250.35. Net, \$150.35.

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STRAWBERRIES (1 acre).—First Premium to John and Joseph J. Quinn,
Essex county.....\$25 00

Soil, heavy clay on level land, underdrained. Variety, Charles Downing, planted in matted rows $2\frac{1}{2}$ feet apart. In the fall applied for a covering 25 two-horse loads of stable manure to the acre, spread upon the plants and allowed to remain during the winter. In the spring this is hand-raked to remove the rough stuff; while growing the rows were hoed and weeded twice before picking and usually twice after picking. Yield, 232 bushels, 17 quarts, marketed in crates holding 32 quarts and sold by commission-house in Newark. Expenses—Manure, \$25; labor, \$5; hoeing, &c., \$32; picking, \$129.75; marketing, about \$7; commission, \$73.01; total, \$271.76; total sales—average sales, 9½ cents per quart. Total, \$730.10. Net, \$458.34.

STRAWBERRIES (1 acre).—Second Premium to Wm. R. Ward, Essex
county..... 15 00

Soil, sandy loam mixed with light clay. Variety, Charles Downing. Rows of plants 5 feet apart when set, which have grown into matted beds about 3 feet wide; kept free from weeds by hand-work in rows and cultivated between. Stable manure, well rotted, spread broadcast in winter, about 15 two-horse loads per acre. Yield, 3,344 quarts. Marketed in new baskets and sold by Quinn & Co., of Newark, and Archdeacon & Co., of New York. Expenses—15 loads manure at \$1.50, \$22.50; picking 3,344 quarts at $1\frac{1}{2}$ cents, \$50.16; spreading manure, cultivating and weeding, about \$35; total, \$107.66. Total receipts, \$338.16. Net, \$230.50.

BLACKBERRIES (1 acre).—First Premium to L. McNinnie, Monmouth
county..... 25 00

Soil, sandy loam and gravel. Vines planted in rows 6 feet apart and 3 feet apart in rows. Plowed twice in spring; used cultivator balance of season and kept clean. Fertilized with marl and manure. Yield, 3,010 quarts. Shipped to New York, Newark and Freehold in 32-quart crates. Freight and commission, \$42. Total receipts from sales, \$254.55.

BLACKBERRIES (1 acre).—Second Premium to John Morris, Monmouth
county..... 15 00

Soil, gravel and clay loam. Vines planted in rows 6 feet apart and 3 feet apart in the row. Plowed twice in the spring, then cultivated the rest of the season with cultivator. Applied a good coat of marl during the winter broadcast. Yield, 2,769 quarts per acre. Shipped to New York and Newark in 32-quart crates. Statement of expenses—Freight and commission, \$39.91. Total receipts from sales, \$209.56.

RASPBERRIES (1 acre).—First Premium to Henry Jerolaman, Essex county\$25 00

Soil, dark, heavy loam with hard, clay bottom, all well under-drained. Raspberries grown with 30 young apple trees on same ground. Vines are set in rows 5 feet apart, about 2 feet wide, leaving a space nearly 2 feet wide to pick in. Plants trimmed in oval form, the center canes being highest. The paths are cultivated twice each year; plants kept free from weeds and grass with hoe. Fertilizer—Only use 10 one-horse loads of coarse stable manure about once in 4 years; manured but twice, and it has been in raspberries for the past 8 years. Yield, 2,327½ quarts (72 bushels, 23½ quarts). All sent to commission-houses in Newark and put in baskets called thirds, about 4 to 1 quart, and selling from 4½ to 7 cents each. Variety, Cuthbert, or Queen of the West. Total expense picking and marketing, &c., \$96.42. Total receipts from sales, \$418.86. Net receipts, \$322.44.

RASPBERRIES (1 acre).—Second Premium to John and Jos. J. Quinn, Essex county..... 15 00

Soil, heavy clay; set, slope of hill. Variety, Cuthbert, planted in rows 7 feet apart; plants continuous in row, held up by two wires brought together every 3 feet with tie wire; tops trimmed in spring; cultivation, plowed once with a single horse, hoed once during the season and cultivated twice; manured with stable manure, using 10 two-horse loads broadcast between the rows. Yield, 4,628 pints—72 bushels—marketed in crates holding 45 pints, delivered by wagon to commission merchant at Newark. Statement of expenses—Manure, cost of hauling, \$10; plowing, \$1.50; cultivation, \$3; hoeing, \$5; picking, \$46.28; trimming, tying, &c., \$5; commission, \$32.40; total, \$103.18. Total receipts average 7 cents per pint, \$323.96. Net, \$220.78.

CURRANTS (1 acre).—First Premium to Wm. R. Ward, Essex county.. 25 00

Soil, sandy loam. Variety, "Fay's," planted between pear rows and kept cultivated between rows; fertilized with 5 barrels chicken manure; placed about each bush; first two years after planting manured with stable manure, plowed in. Yield from 1²⁹⁸/₁₀₀₀ acres, 2,048 quarts, \$214.93, or 1 acre, 1,578 quarts, at \$165.59. Sold in quart baskets in Newark market. Statement of expenses—Cultivating twice; crop of pears paid labor picking 1,578 quarts at 1 cent, \$15.78; 5 barrels chicken manure, \$5; total, \$20.78. Total sales, \$165.59. Net, \$144.81.

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DAIRY PRODUCT.

INCOME OF DAIRY (10 cows).—First Premium to William B. Lippincott, Burlington county.....\$100 00

From herd of 14 cows, I received during the past year 26,763 quarts of milk, which brought wholesale in Philadelphia \$1,258.64. Value received for calves, \$166.75, making a total of \$1,425.39, an average of \$101.89 per cow. Expenses—Pastured on upland in summer; in winter, fed clover hay and corn stalks; their mess night and morning consisted of cob meal, bran and cotton-seed meal; estimated cost per cow for grain, \$20.

INCOME OF THE DAIRY (10 cows).—Second Premium to John M. Lippincott, Burlington county..... 50 00

High-grade Jersey and Guernsey. Expenses consist in driving every morning four miles to deliver to retailers. Statement of product, 14 cows yielded 27,369 quarts of milk; returns from retailers, \$1,360.05. The calves amounted to \$42, a total of \$1,402.05, or an average of \$100.14 per head. They had during last winter two feeds of hay and one of stalks daily, and two feeds of grain, consisting either of corn and cob meal, or of cereline feed to the amount of from 4 to 6 quarts per cow (according to size of cow and time they have been milking), with wheat chaff, moistened and allowed to remain wet between feeds, with run of yard during mild weather. During summer spent day and night on permanent pasture, with light feed of either green corn or cereline meal a portion of the time when brought to the stables for milking.

(Signed), THEO. F. D. BAKER,
H. I. BUDD,
I. W. NICHOLSON,
State Board Premium Committee.

CONTAGIOUS DISEASES OF ANIMALS.

BY EZRA M. HUNT, M.D., SECRETARY OF THE STATE BOARD
OF HEALTH.

CONTAGIOUS DISEASES OF ANIMALS.

At the time of our last report to February, 1891, there was less of the various contagious diseases of animals in the State than for many years previous. Pleuro-pneumonia had nearly ceased to exist. Glanders among horses was much less frequent than formerly, and the great pest of swine plague had not occurred so seriously as in former years. Although bovine tuberculosis was exciting more of popular attention and inquiry in the most susceptible portion of the State, it had not revealed any increase. As to but one of these diseases is it claimed that complete examination and no recurrence are possible. Pleuro-pneumonia is a foreign disease, and, like cholera, has never become indigenous in this country. It has not, in this State, even shown itself as a virulent or rapidly-spreading contagion. For ten years this Board was able to keep it so far in check that but few losses of cattle occurred therefrom. Yet it was greatly desirable that the State should be completely rid of it. This could not occur but by national intervention, since the disease comes to us always from New York and Pennsylvania, and control of interstate traffic is necessary. Hence, we accepted the aid of the National Government, and all the more readily because with its ready wealth, its liberal views of expenditure and its radical measures it could save the State expense. Our own records and those of the government show how little of the disease existed in the State when the Bureau of Animal Industry first came in oversight, and how few concealed cases were discovered. After a time a few new outbreaks occurred, which were quarantined by the Board and dealt with by the authorities. Since our last report very few cases have occurred in the State, and on May 1st we had the satisfaction of raising the quarantine which for over three years had existed in Hudson county. As it is not rapidly contagious, or contagious at long distances, it is much easier of control than many other animal diseases.

Tuberculosis has attracted considerable attention the past year, and occupied the careful attention of the Board. Inasmuch as any prevalence of it has important bearing upon questions as to dairy supply, we have had the effective co-operation of George W. McGuire, the Dairy Commissioner.

The Secretary in the last report of your Board set forth the principal facts as to it. His recommendation as to the inspection of city dairies met with general response from the State Agricultural Society, and was provided for in the law looking to the appointment of a Commissioner of Agriculture. Just at the close of the session this law, which embodied various other provisions, failed of passage, and so we were left without the important provision which we believe commended itself to all.

In March, owing to an outbreak of tuberculosis in the town of Somers, New York, the Mayor of New York City addressed a note to His Excellency Governor Leon Abbett, drawing attention to the fact that the New York City Board of Health felt the importance of the subject so much as to suggest the co-operation of our State in an effort to protect the meat and milk-supply from the evils which might possibly arise from the disease.

The Governor transmitted the correspondence to the Dairy Commissioner, who in turn conferred with this Board as to what it thought best to do. While it was not found feasible to enter upon any special plan of co-operation, attention was drawn to the consideration already given by this Board to the subject for the several years past and our continued interest in and attention to the subject declared.

Soon after, the State Board of Health resolved to get more accurately at certain statements in relation to the prevalence of the disease and its influence on the public health. The Secretary of the Board and the Dairy Commissioner co-operated in a plan by which we might be able to inform ourselves more definitely as to alleged cases, and also to test the effect of the presence of the bacillus tuberculosis in the meat and milk-supply. Accordingly, prominent and reliable veterinarians in the State were asked to report to us cases of the disease in milch cows, and especially cases in which the disease was likely to be found in an acute form or as recent as within two months.

Early in June an outbreak was reported directly to us by the owner, in a herd near Fenwick, Cumberland county. A competent veterinarian of the Bureau of Animal Industry made a post-mortem of one

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of the cases and pronounced it tuberculosis. Subsequent facts, however, proved this to be a mistake in diagnosis. A specimen of the milk was taken to Prof. Formad, of Philadelphia, who, after careful test and microscopic examination, reported that the bacillus tuberculosis could not be found. Another case of tuberculosis was just then reported to us by the Bureau of Animal Industry, at Freehold, and a person sent to secure specimens of glands, lungs, muscle, udder and milk, but here too the diagnosis showed the disease not to be tuberculosis. The Health Officer of Newark kindly co-operated with us by ordering a close examination of all dairies in that city by a competent veterinarian, in order to secure their general healthful condition, to discover any cases of unfit milch cows, and especially to detect any cases of bovine tuberculosis. The Camden Board of Health also easily co-operated, since not a dozen cows are kept in the city, and none were reported as diseased. A full report from Paterson showed that many cows were kept within the city limits, but no cases of tuberculosis were reported. About this time (June, 1891) a farmer at Hainesville, Sussex county, wrote an inquiry as to whether the State Board of Health could do anything in reference to some sickness he had among cattle. The herd was promptly visited by competent veterinarians, and both by general and post-mortem examination it was found that bovine tuberculosis existed in the herd. Its history is as follows: Over a year before the owner had purchased some Jersey cows at a public sale of Jersey cattle. Not very long after, one of the animals was sick, showing cough and other lung symptoms, and was killed by the owner. Other cattle in his milch herd of 13 began to cough, but it was not until after the lapse of so long a time that any report was made to us. The first examination showed 9 of his cattle affected more or less. The herd was at once quarantined and the use of the milk prohibited by the Dairy Commissioner pending further examination. Specimens of lungs, muscle, udder and milk were sent to Prof. H. F. Formad, of Philadelphia. The following is his report thereupon :

EXAMINATION OF MILK AND VISCERA FROM CASES OF
TUBERCULOUS CATTLE.

UNIVERSITY OF PENNSYLVANIA,
PATHOLOGICAL DEP'T,
PHILADELPHIA, Aug. 1st, 1891. }

GENTLEMEN—I beg leave to give the results of my examinations of the specimens from three tuberculous cows and one calf, the specimens being certain viscera, including the udder, and various samples of milk from the same cattle.

The viscera examined were sent to me on June 24th and on July 11th, while the specimens of milk were received on June 11th and during the early part of July, said to have been taken from the same cattle.

SPECIMENS RECEIVED JUNE 24TH, 1891.

I. *Specimens from tuberculous cow.*

A. *Lung* shows fully-developed tuberculosis with caseation, and microscope revealed numerous tubercle bacilli. Bronchial lymph-glands swollen and showing cheesy necrosis and tubercle bacilli.

B. *Udder* from the same cow carefully examined microscopically, but no trace of tuberculosis or bacilli found.

C. *The milk* from this cow was submitted to careful tests, such as will be detailed below, but no tubercle bacilli were discovered.

D. *Lungs from calf* carried by this cow for eight months. Microscopical examination failed to reveal any trace of tuberculosis. The lung-structure was perfectly crepitant and without any foci of hepatization or any enlargement of bronchial glands. Tubercle bacilli absent.

SPECIMENS RECEIVED JULY 11TH.

II. *Specimens from tuberculous cow sick two years.*

A. *Lung* shows advanced tuberculous affection with caseous degeneration; tubercle bacilli in abundance. The masses in the costal pleura (which accompanied this specimen) are also tubercular, but show only few tubercle bacilli, and but slight cheesy change.

B. *Udder* is perfectly normal. Careful microscopical examination

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of all parts of the piece received did not show any tubercle bacilli and no tubercle granulations. Portions of the tissue were submitted to culture methods, but these failed to reveal bacilli, as well as the staining methods.

C. *The milk* from this cow failed also to show tubercle bacilli, both on staining and culture methods. The milk appeared to be of good quality.

III. *Specimens from tubercular cow sick two months.*

A. *Lung* shows one well-developed tubercular mass and numerous smaller foci, all containing tubercle bacilli in limited number.

B. *The udder* is perfectly normal and free from tubercular lesions. No trace of bacilli found in microscopical section properly stained nor upon culture.

C. *The milk* from same cow (sample in blue bottle) is absolutely free from bacilli; it seems, however, to be of poor quality, being watery and poor in fat.

SUMMARY.

Collectively the results of the examination of all the samples of milk (of which seven were examined), and of the viscera from tuberculous cattle, sent to me, may be summed up as follows:

1. *Milk*.—Not one of the specimens so far examined showed any trace of the tubercle bacillus, and with two exceptions the milk appeared to be of excellent quality.

2. *The udders* in each case were normal and showed no trace of tuberculization.

3. *The lungs* in each instance (save from the lung of the calf carried eight months) showed typical bovine tuberculosis (pearl disease).

4. *The bronchial lymph-glands* of the adult cattle examined showed, as well as the lungs, tuberculosis and tubercle bacilli.

REMARKS.

These observations, as far as they went, revealed facts that are absolutely conclusive. The examination was conducted with all means known to science, and I was assisted in the work by my

brother, Robert Formad, V.M.D., of the Veterinary Department of the University. Special attention was paid to the milk and udders of the cattle. After failing to find tubercle bacilli (the milk and udder) by microscopic and staining methods, we resorted to culture experiments by the glycerine-agar, and by Koch's blood-serum method, as well as by Woodhead's method. We also inoculated twelve guinea pigs into the anterior chamber of the eye with each of the samples of milk, and one with each of the three specimens of udder under examination. After watching the experiments of from three to eight weeks' duration, we found that nothing developed which in the least would indicate the presence of tubercle bacilli.

We think it now safe to conclude, from the experiments as far as carried out, that neither the milk nor the udder in the three tuberculous cattle examined showed any trace of tubercle bacilli.

COMMENTS.

In my experience the udder is rarely affected, even in fully-developed internal tuberculosis of cattle. I have found tubercle bacilli (in cases *other than those referred to above*) once in fifty cases, in both milk and udder of tuberculous cattle. In the meat I never found bacilli, even in highly-tuberculized cattle.

I am fully convinced that the dangers from the use of milk from cows affected by tuberculosis are much overdrawn, notwithstanding the contrary statements of some good authorities. Opinions among scientists on this subject are much divided, as is well known.

The tubercle bacilli being the established poison of tuberculosis, the observations in the three cases above recorded conclusively prove that in spite of tuberculosis of internal organs the milk was not contaminated. The reason for this is, I think, that the udders were normal. I think that only when the udder is tubercular (which fact could be easily established in the living animal by examining the udder and its surroundings for enlarged lymph-glands), there would be risk from the milk.

Naturally the milk from tuberculous animals must be of inferior quality. It is probably less nourishing, less rich in fat, and hence is an imperfect and improper article of food, and in this way the milk is harmful. I would recommend that a few more observations be made.

Respectfully,

HENRY F. FORMAD, M.D.

We again urge that not another year shall pass without legislation as to the care of city stables as necessary in order to guard against this and other diseases, and against such keeping of cattle as endangers the purity of the meat and milk-supply. The English Government has found it necessary to adopt special laws on this subject much more stringent than any contemplated by us. It is the part of common prudence and greatly for the public welfare that Local Boards of Health should be charged with this important care. During the past summer (July, 1891) a congress on the subject of tuberculosis was held in Paris. There was re-affirmation of former views as to the risks of milk from tuberculous cows. As to degree of risk from meat, there was great divergence of view as well as at the International Congress of Hygiene, held soon after in London. At the latter, attention was drawn, in a paper by Prof. Crookshank, to actinomycosis as a disease often mistaken for tuberculosis. (See Circular L.)

It is still too common to pronounce any case of failing health and of cough in cattle as tuberculosis without any accurate and skilled evidence. Dr. Edgar Holden and Dr. J. W. Stickler, of this State, ably discussed the subject of bovine tuberculosis at the meeting of the State Medical Society, 1891, and accepted the general view as to the reality of the danger from it, but chiefly in the consumption of milk.

GLANDERS AND FARCY.

There have been, as usual, a few outbreaks of glanders in the State, and some few cases of farcy, the chronic form of the disease, have been discovered. At the closing of this report, we find it especially in Newark.

It occurs most in car-stables, and is spread by the sale of a poor class of horses, or by gypsy or other low traders.

At Newark and Paterson, and in Camden, Cape May and Gloucester counties, the chief cases have occurred and have been promptly attended to. Single cases have occurred in Morris and Somerset counties. We append a brief and valuable paper by Dr. Gerth, of Newark, who has seen most of these cases.

We refer also to the full treatment of the subject in previous reports. A brief outline of cases has also been furnished by Dr. Rogers, of Woodbury, Dr. Lowe, of Paterson, and Dr. Gerth, of Newark.

SWINE PLAGUE.

Swine plague has been reported to us from a few localities, but not as frequent as in former years. We refer to former reports for all the available facts as to it.

During the year Circular L of the State Board of Health has been entirely reviewed and so far rewritten and added to as to be practically a new circular. It is printed as a part of this report, and can be had on application by postal to the Board. It contains the chief laws and references, and will be found an aid to farmers and stock-raisers in guiding them as to the methods of protection from the occurrence and spread of many diseases.

At the date of February 1st, 1892, when this report closes, we have been able to release from quarantine all but four stables of cattle quarantined on account of pleuro-pneumonia or exposure thereto, and all but one of the stables in which glanders has occurred.

REPORT OF J. GERTH, JR., D.V.S.

NEWARK, N. J., January, 1892.

Dr. E. M. Hunt, Secretary State Board of Health, Trenton, N. J.:

DEAR SIR—During the year of 1891 we had, for some reason or another, an unusual number of outbreaks of glanders and farcy among the equines of this State, and I believe that the spreading of this disease among horses has largely been caused by the indifference of veterinarians in reporting cases to the proper authorities.

The first outbreak reported was at Fanwood, N. J., possibly traceable to the existence of glanders at Plainfield and Scotch Plains in December of 1890.

The next outbreak was reported from Orange, N. J., at the stables of Mr. Browner, which could not be traced; yet it was followed by another at the stables of Messrs. S. & C. Lindlsey, of the same city,

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simultaneously with that of J. A. Beyer & Co., of Newark. The horses of Messrs. Beyer & Co., I hear, were frequently sent to Orange.

The case of Mr. Lueddecke, of this city, proved to be a case of chronic catarrh, usually termed "nasal gleet."

This was followed by the report of its existence at the stables of the Hill Brewing Company, in this city, and at their farm in South Orange, where it existed to an alarming extent a long time before the State Board of Health received any notification thereof, and it is my opinion that some one has been guilty of criminal negligence, if not of ignorance or duplicity. I desire to state here that after the stables were quarantined by the State authorities, and after Mr. Hill was informed of the serious and dangerous nature of the disease, he made every effort possible to assist in eradicating the same.

The outbreaks at Bernardsville and at Morristown, it is claimed by parties interested, can be traced to the stables of the Hill Brewing Company.

The outbreak at Braüers, on Pioneer street, this city, and that of Smith & Connery, corner of Plane and Academy streets, also of this city, as well as that at the stables of Mr. Rafferty, at Elizabeth, N. J., undoubtedly can be traced to the market-place of Newark, where a large number of horses come in contact with one another on market days. These horses should be frequently inspected by the veterinarian of the Local Health Board.

How the horses of Mr. Ehrlich, on Rose street, Williams, on South Eighth street, and of Mr. Raymond, on First street, all of this city also that of Mr. McGrath, of Elizabeth, became infected, is unknown.

At present only two stables and the horses therein continue in quarantine, the one at Newark, Mr. Williams', on South Eighth street, and that of Mr. Steve Gerry, at Bernardsville, N. J.

Tuberculosis Among Cattle.—There was but one outbreak—that at Hainesville, N. J.—where, owing to its general prevalence in the herd, it was thought best to kill all afflicted therewith, especially so as it is now claimed by almost all authorities that the meat and milk of cattle so afflicted can transmit this dreaded disease to man.

REPORT OF THOMAS B. ROGERS, D.V.S.,

WOODBURY.

Dr. E. M. Hunt, Secretary :

I have the honor to report that during the year now ending there has been but little contagious disease among the live stock of South Jersey. My attention was called to an outbreak of splenic fever on the farm of Elijah Eastlack, of Shirley, and a post-mortem revealed a very marked case of the disease. The cattle were steers from the Philadelphia drove-yard, and death and the butcher rapidly cleaned out the outbreak. There does not seem to be any way to prevent an occasional outbreak of this kind, and as it is generally confined to the farm where found, there is not a great deal of danger to be apprehended from it.

The outbreak of glanders at Mays Landing was stamped out after the destruction of three horses and disinfection of the barn. Two were destroyed by the owners at my request, and the Township Committee bought the suspected one and destroyed it. In December I was called to Pennsgrove to see a supposed case of pleuro-pneumonia, but found a case of ordinary pneumonia, so situated that contagion was not possible. There has been little hog cholera this year, and no anthrax has come under my notice. Although veterinary science has made big strides during the last twenty years, it does not seem to be appreciated by some of our farmers.

In a report from the meeting of a farmers' institute in South Jersey I lately read that the farmer must be better educated in anatomy and physiology, &c., in order that he be not a prey to the horse jockey and the veterinary surgeon. I should like to say here that the veterinary profession has done more for the farmer than it has received from him. There are few shoeing-smiths nowadays who have not some regard for the physiology of the foot. There were many before the advent of the veterinarian. Lamé horses are less plentiful. Our farmers have access through your Board to skilled veterinary service in cases of contagious disease without cost to them. I will grant that sometimes a farmer pays fees to the veterinarian and gets no benefit therefor, and it usually happens about this way : An animal falls sick, say a cow, and after the farmer has split the tail, bored the horns,

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scraped the tongue, given a couple of pounds of salts and a salt mackerel, bones and all, the animal is getting no better fast. He then sends, not for the veterinarian, but for some fellow who, having failed at all else, has assumed the role of the veterinarian, and at last when the farmer, his friends and the cow-leech have brought the cow into the valley of the shadow of death, he sends for the veterinary surgeon. He tells him there is no hope and pockets five or ten dollars of his good money (according to distance) for the information. Is not the farmer rather than the veterinarian to blame for this condition of affairs?

If the farmer sends in time for a competent veterinarian he will get value received for the money expended. The real gist of the matter is that at the bottom of his heart the farmer feels that the veterinarian is a necessity to him, if his services could only be had cheaper. Let me tell the farmer that the way to cheapen the services of the veterinarian is to employ him. A radius of ten miles in a good agricultural community should give an educated veterinarian a good living, but it does nothing of the kind. Just as long as the farmer treats the doctor as only an "emergency man," just so long he will pay "emergency prices."

REPORT OF DR. LOWE.

PATERSON, N. J., December 31st, 1891.

Dr. E. M. Hunt, Secretary State Board of Health:

During the year I have inspected, in behalf of the State Board of Health, several herds of cattle where cases of contagious pleuro-pneumonia have been reported, but in every case I have found the animals affected with diseases essentially different.

In January last report was made to the Paterson Board of Health that not only was the herd of Mr. Henry Vail, at Preakness, badly diseased, but that the milk from this herd was being sold in the city of Paterson. In support of this report, the man making the complaint brought a diseased lung to Paterson, which he affirmed was from a cow which he had recently bought from Mr. Vail, and which became so badly diseased that he was obliged to kill her. Upon examination I found that the lung tissue was from a tuberculous cow. The Paterson Board of Health at once notified the State Board of

Health at Trenton, and asked that the State Board authorize an inspection of the herd of Mr. Vail. I received instructions, under date of January 19th, from Dr. Hunt, Secretary of the State Board, to investigate the matter at once. On the 20th instant, in company with John L. Leal, M.D., who represented the Paterson Board, I visited Preakness and made a thorough examination of the herd in question. I found all the cows in good condition except four or five, but in these animals I found no developments of tuberculosis, pleuropneumonia or other contagious disease. I advised, however, than an oversight be kept over this herd for some time, inasmuch as one case of tuberculosis had been traced to it. My investigation satisfied the Paterson Board, and they allowed Mr. Vail to continue the sale of his milk in Paterson.

All sensational reports concerning tuberculosis, pleuro-pneumonia and other contagious diseases are calculated to create alarm and oftentimes do infinite harm. What your Board wants is real facts and data rather than opinions. I cannot go into details at this time, but I would say a few words as to bovine tuberculosis. I have examined many animals affected with the disease as well as made frequent post-mortem examinations. If it be true, as many of the most eminent investigators now claim, that the disease is transmissible to the human being through the milk and meat, it is certainly high time that measures be taken to stamp the disease out. It is no new thing for enlightened veterinarians to warn the public of the danger from bovine tuberculosis, and it is a significant fact that the human practitioners at last are beginning to realize what the veterinary profession has for years been trying to get Boards of Health to consider. I note that Dr. Stickler, of Orange, has recently read a paper on human and animal tuberculosis at the last meeting of the State Sanitary Association, and I have no doubt that ere long the subject will be dealt with in the interest of both human and animal life. Some legislation is required on this subject in our State, and I trust that the Legislature will place full authority in the hands of the health authorities to stamp out bovine tuberculosis.

GLANDERS.

Glanders broke out at Lodi, Bergen county, and in the Dundee section of Passaic about a year ago, which it has been difficult to

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exterminate. Many horses had to be sacrificed. Horses as follows were destroyed by my order :

February 23d, one horse, the property of Cornelius Backler, Passaic, N. J.

May 4th, one horse, the property of Mr. Ryan, Passaic, N. J.

May 23d, one horse, the property of Mr. Perkins, Bergen county. (A horse had also died from glanders on the same premises a short time previously.)

August 20th, one horse, the property of Daniel De Blaker, Lodi, N. J.

October 11th, one horse, the property of Daniel De Blaker, Lodi, N. J.

October 11th, one horse, the property of Stephen Massey, Lodi, N. J.

November 25th, one horse, the property of James Roden, Jr., of Rutherford, N. J.

The following isolated and untraced cases were destroyed :

———, one horse, the property of A. H. Snow, Charlottesville.

———, one horse, the property of James Van Kirk, Paterson. (Horse had been sent out from New York to recuperate.)

May 30th, one horse, the property of the city of Paterson.

December 25th, one horse, the property of J. Westhoven, Paterson.

The premises in each case were thoroughly disinfected and every means adopted to prevent the further spread of the disease. The above list only contains the diseased horses that were destroyed. I examined a large number of horses in the infected locality and elsewhere that were affected with complaints of an entirely different nature, which I do not consider it necessary to mention in this report.

In some sections the loss to farmers from hog cholera has been considerable. In my opinion information as to the prevention of parturient apoplexy in cows should be disseminated among the farmers, as the loss from the disease is large, much of which could be prevented by intelligent care of the cows before calving.

As usual, the prevalence of canine rabies is reported every now and then. Two well-authenticated cases of rabies in cows have been reported to me during the year.

A BRIEF DESCRIPTION OF THE SYMPTOMS OF GLANDERS
AND FARCY IN HORSES.

BY J. GERTH, JR., D.V.S.,

Veterinary Inspector for State Board of Health.

Glanders, or farcy, may be defined as a contagious disease peculiar to the equine family. It is transmittible to man, and all domestic animals except cattle. Glanders and farcy are only different forms of the same constitutional disease affecting horses. If a sound animal be inoculated with the matter of glanders or farcy, it may produce either one or the other or both. The disease, although usually chronic, will frequently terminate in acute glanders before death. The infectious element of glanders has a fixed character, and, as experience proves, it may possibly be suspended in the atmosphere. This explains the rapid communication of the disease from animal to animal in an infected, overcrowded, poorly-ventilated and imperfectly-drained stable, where the air soon becomes loaded with the infectious principles by means of the expired air from glandered horses. In open fields and pastures the disease does not spread so rapidly, and is rarely if ever communicated, except by direct inoculation, because the contagion is soon sufficiently diluted so as to become harmless.

In this as in other contagious diseases, a small percentage of the exposed animals will not become infected. This may be dependent upon the virulence of the glander poison, or upon the general condition of the animals at time of exposure. Animals in good health do not seem so susceptible to infection as those that have their constitutions weakened by improper care, feeding, exposure, &c. The infectious element of glanders is distributed through the system by means of the blood. The virus of glanders may, under favorable circumstances, retain its activity for a long time. Boiling water, fire, chemicals and certain disinfectants will thoroughly destroy its activity when brought into actual contact with the same. It is also claimed that putrefaction will have the same effect. The period of incubation in glanders varies from three to six days to as many weeks. Glanders in its chronic form may continue for months and years before terminating in death, while acute glanders may cause death in from five to fifteen days.

The symptoms of glanders are inaugurated by a scanty, rarely

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copious discharge from one or both nostrils, aqueous at first, afterwards glaring, and gradually assuming a brownish-yellow color. The discharge, intermittent at times, is usually continuous. It is of a sticky, glue-like nature, and at times is streaked with blood. It adheres to the outer edge of the nostril, and sometimes clogs up the nasal air-passages to such an extent as to cause difficulty in breathing. The discharge is not offensive, except when ulceration has taken place to such an extent as to destroy the cartilage and other tissues of the head, or when there is necrosis of the bones of the head, or a decayed tooth present also. The discharge is said to be most frequent from the left nostril. I have seen it as frequent from the right, and from both nostrils, as from the left.

The discharge is the most common carrier of the contagion. The submaxillary gland or glands under the jaw-bone are enlarged, hard and painless to the touch, gradually becoming adherent to the bone, and do not show any disposition to suppurate or disappear. There is also tumefaction of the nasal cavities and swelling of the lymphatic glands of the head and legs. Frequently, also, an accumulation of whitish matter in the corner of the eye, on the diseased side of the head.

The principal symptom, however, which leaves no doubt as to the existence of glanders, is the formation of cancerous ulcers on the lining membrane—(Schneiderian membrane, or septum)—of the nostrils. Frequently the septum of the nose assumes a peculiar, leaden hue, and small gray spots (glander nodules), varying in size from a pin's head to that of a pea, make their appearance, and precede the formation of glander ulcers. The ulcers rapidly increase in number, and extend along the larynx and trachea. They have a yellowish, fatty base, and pinkish, ragged-edged elevation. Sometimes they are deep-seated, and frequently will eat through the septum, leaving a hole about the size of a twenty-five-cent silver-piece, through which one's finger can easily be passed from one nostril to the other. The ulcers generally are unhealthy in character, but sometimes will show a disposition to heal. When healed, scars radiating from a central point (stellated scars) remain, of a white color and in striking contrast with that of other portions of the membrane.

Should all external symptoms be absent, the presence of glander ulcers would make the diagnosis a certainty. Ulcers can generally be seen on the lower or anterior portion of the septum; at times

they will not develop at that point, but will form on the upper or posterior portions, where they cannot be detected.

In cases produced by inoculation, ulceration usually follows in from four to twelve days after the appearance of the nasal discharge. External glanders or farcy, known among the laity as "button farcy," manifests itself in the skin of the diseased animal. It is ushered in with a slight febrile disturbance, but this symptom may be so slight as to escape observation. In most cases the disease indicates itself by the appearance of small knots and cords on the legs, shoulders and face, swollen lymphatic glands and ducts. The knots break out into deep, yellow-edged ulcers called farcy-buds. When the constitution of the patient is good and other circumstances are favorable, this form of glanders does not appear in a very virulent form; in fact, sometimes the disease seems at a standstill for weeks and months. Another form of farcy that may appear is that of "farcy tumors." The tumors vary in size from a hen's egg to a man's fist, and are generally located on the haunches or croup, and never exhibit any tendency to ulcerate. Appearing suddenly, they are hard, at first a little painful, and always well defined. They soften rapidly, though they have rarely been observed to open spontaneously. When punctured, the discharge that escapes is thick, slightly yellow and creamy. According to the rapidity with which the symptoms of glanders develop, it is termed acute or chronic. These two forms of the disease may be observed in the same animal singly, simultaneously or successively. In the horse it generally appears in the chronic form; in the ass and mule it is most frequently acute. In acute glanders the above-mentioned symptoms are usually very prominent. Acute glanders is generally ushered in with a slight fever. It does not invariably develop from the chronic form, and may be present from the first.

In acute glanders, the appetite is lost and the animal emaciates rapidly until death closes the scene.

In chronic glanders many of the previously-mentioned symptoms are absent, and but two or three are present, viz., a scanty, glue-like discharge, enlarged submaxillary gland and ulceration on the septum of the nose. Nevertheless, when these three main symptoms or only two of them are present and fully developed, the veterinarian is justified in making a positive diagnosis.

Animals with chronic glanders generally remain in good condition,

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and retain their appetite. They often communicate the disease. Occult (pulmonary, latent) glanders, on account of its obscurity, must be considered one of the most dangerous forms of the disease. Sometimes it can be suspected, but rarely diagnosed, and then only on circumstantial evidence.

It happens frequently that a horse may have glanders and communicate it to other animals without showing a single symptom which would lead one to suspect the disease.

Numerous such instances are on record. As glanders is an incurable disease, all medicinal treatment is useless. In ancient days it was believed that the disease could be subdued, if not cured, by therapeutical agents. In the seventeenth century it was a common practice to have no less than ten drugs in one prescription. The compounding was generally done in the most unscientific manner, and the most violent remedies were employed.

All the active poisons have been employed again and again without success. In pursuance of this blind, empirical plan, and in the vain hope of finding a specific, the various preparations of arsenic, antimony, zinc, copper, mercury, &c.; also, hellebore, aconite, digitalis, hyoscyamus, belladonna, cantharides, capsicum and numerous other drugs were tried, but all to no avail.

The only rational treatment consists in the immediate destruction of all glandered animals. By invariably adopting this treatment, glanders can be thoroughly eradicated and the State freed of this most loathsome disease, dangerous to both man and beast.

It will pay every horse-owner to be careful in buying or trading for a horse, especially if the animal is running from the nose and has an enlargement under the jaw. I would also advise that no horse be purchased except from responsible and honest dealers, and in case of doubt first to have the animal examined by a competent veterinary surgeon. The purchaser should in every case demand a responsible guarantee that the animal is free from contagious diseases.

HOW TO EXAMINE A HORSE FOR GLANDERS.

To examine a horse for glanders, place him in a stable before an open door, cause an attendant to raise his head so that the light will shine up the nostrils. The examiner should stand a little aside, and with his thumb and first finger dilate the nostrils, so that the inside

of the nasal cavity may be exposed to view. Ulcers, if present, can easily be seen; if not, any nodosity can readily be detected by passing the finger over the lining membrane of the nasal cavity. Persons with wounds or excoriations on their hands or face should have nothing to do with the examination of a horse suspected to have glanders or farcy.

DISEASES THAT MAY BE MISTAKEN FOR GLANDERS.

Distemper, catarrh and nasal gleet are diseases sometimes mistaken for glanders. In distemper the horse is sick, off his feed and very feverish. The submaxillary and parotid glands become inflamed, suppuration soon takes place in the surrounding tissue, terminating in an abscess. With good nursing and proper treatment the animal rapidly recovers.

Catarrh, or common cold, is an acute inflammation of the mucous membrane lining the air-passages of the head. It is the same as cold in the head in the human subject.

The discharge from the nostrils is watery. The animal recovers speedily. Nasal gleet is the name given to the chronic discharge from one or both nostrils. It is generally intermittent, rarely continuous, and not of that sticky, glue-like and adherent character peculiar to glanders. Ordinarily the matter is white, and of the thickness of cream. It falls freely from the nostrils. Nasal gleet is seldom associated with an enlargement of the glands, and, if enlarged, they do not adhere to the bone. The septum of the nose is free from ulceration. If the trouble has not become chronic, it will respond to treatment.

Parties communicating with the State Board of Health in relation to the supposed existence of glanders and farcy in horses, mules or asses, should endeavor to give correct information in regard to the existing conditions.

DISINFECTION.

Stables in which glandered animals have been kept should be thoroughly disinfected. The stables should first be vacated and cleansed of manure and other refuse, including fodder and litter of every kind that may cover up the infected matter. The walls and partitions should be well scraped and washed with boiling water.

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The floor, if of wood, should be taken up and destroyed, and at least six inches of the dirt beneath the floor should be removed and replaced with fresh earth. Mangers, hay-racks, feed-boxes, currycombs, brushes, water-pails and all refuse should be burned. After the barn has been thoroughly cleansed it should be closed up tightly so as to exclude the outer air and fumigated with the burning of roll sulphur* or sulphur brick.

To fumigate a barn break up the sulphur in small pieces, and after placing it on an iron plate or metallic dish set it on fire, then leave, closing the door behind you. Three pounds of sulphur is sufficient for one thousand cubic feet of space. Keep the barn well closed for at least three hours after the burning has ceased. Then air well for two or three days and afterward whitewash all woodwork with a mixture containing four ounces each of carbolic acid and chloride of lime to each gallon of whitewash.

Painted iron and woodwork, after being thoroughly cleansed, should be repainted. To disinfect harness, robes, grain-bags, blankets and all textile fabrics, including ropes used about diseased or suspected animals, boil in a solution of carbolic acid (two ounces of the acid to one gallon of water) or fumigate with sulphur as described above.

All feed, hay and straw should be used cautiously or fed to cattle. The best disinfectant, but one that is not so easily applied, is chlorine gas. To fumigate a barn with this, take—

Chloride of lime	7 ounces.
Water.....	21 ounces.

Mix in a porcelain or earthen vessel, then add—

Hydrochloric acid.....	14 ounces.
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After which the gas will develop freely. After adding the acid withdraw rapidly and close the barn air-tight. This mixture will be sufficient to disinfect any ordinary-sized barn (one in which about two animals are kept). For a large stable the quantity of this mixture must be increased accordingly.

As this method does not necessitate the taking of any precautions against fire it may be especially recommended. Before using chlorine gas remove all plated articles and colored fabrics, such as robes, &c.

* If roll sulphur is used a little alcohol should be added before setting it on fire.

CIRCULAR 50

OF THE

STATE BOARD OF HEALTH OF NEW JERSEY.

To Farmers and Stockmen as to the Contagious Diseases of Animals:

The act of 1877 constituting a State Board of Health made it one of the duties of this Board "to make inquiries and reports in reference to diseases affecting animals and the methods of prevention." At our first meeting, May, 1877, the diseases of animals were directed to be inquired into, and information to be collected as to any epizootics that had occurred within the last five years, as preparative to further investigations. (First Report, page 17.) Our second report (1878, page 25, and pages 148-163) treated of the subject more fully. Owing to the special threatening of contagious pleuro-pneumonia the Legislature of 1879 passed an act giving special power to the Governor, who called to his aid a special corps of assistants. The working of the law was found unsatisfactory, and it was repealed soon after the assembling of the next Legislature. At the close of the session a bill was passed placing the entire control of all contagious diseases of animals under the care of the State Board of Health. (Fourth Report, pages 43-45, and pages 237-247.) The law now is, in substance, nearly the same as then enacted. We herewith give the law as amended and re-enacted in 1886, and as it now is:

LAW OF 1886.

An Act concerning contagious and infectious diseases among animals, and to repeal certain acts relating thereto.

1. BE IT ENACTED by the Senate and General Assembly of the State of New Jersey, That in case any contagious or infectious disease shall appear or be suspected to exist in any locality in this state, it shall be the duty of all persons owning or having any interest in animals infected or supposed to be infected, and of any person having knowledge or suspicion thereof, at once to notify the state board of health, or some officer or member of said board, of the facts, and it shall be the duty of the said board, upon receiving such information, or any information in regard thereto, to investigate the same, or cause the

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same to be investigated, and if any such disease is found to exist, or likely to break out, to quarantine such animal or animals, and to take such precautionary measures with relation to other animals exposed to such disease as shall be deemed necessary, and to enforce such regulations in relation to such diseases as the said board may adopt.

2. *And be it enacted*, That whenever in the judgment of the said board, its agents or appointees, it shall appear that such disease is not likely to yield to remedial treatment, or that the expense of such treatment will be greater than the value of the animal or animals infected; and when in any case such disease is likely, in the judgment of said board, its agents or appointees, to be communicated to other animals, they shall cause the animals infected to be immediately slaughtered, their remains to be buried at least four feet beneath the surface of the ground, and all places in which the same have been kept to be thoroughly cleansed and disinfected.

3. *And be it enacted*, That when any animal or animals shall be slaughtered as directed in the preceding section, the value of the same may, at the request of said board or any person interested, be ascertained and appraised by three disinterested freeholders resident in this state, who shall make and sign a certificate thereof, in the presence of a witness who shall attest the same; such appraisement shall be made on the basis of the market value of the animal or animals slaughtered, just prior to the time when they became so diseased, and shall be limited to the sum of one hundred dollar for registered animals, and to forty dollars for all others; one-half of the valuation so ascertained shall be paid by the state on the presentation of such certificate, with the approval of the said board indorsed thereon, to the owner or owners.

4. *And be it enacted*, That when any herd or portion thereof has been or is so exposed to any contagious or infectious disease, and the state board of health deem the disease likely to spread to that portion of the herd still unaffected, although isolated or quarantined, said herd may, with the consent of the owner or owners, and with the restrictions agreed upon between them and the executive officer of the state board of health, cause or allow said herd or herds to be inoculated for the prevention of such diseases as can be thus mitigated; but any loss resulting from such inoculation shall not constitute any claim against the state, or the board of health; *provided*, that inoculation for pleuro-pneumonia shall in no case be allowed without the consent and approval of the state board of health, and shall be made under its direction.

5. *And be it enacted*, That when any city, township or district shall be threatened with any contagious or infectious disease among animals to such an extent as to seem to require more general precautions, the state board of health shall notify the local board of health, and, with the advice and consent of the local board of health, may for a time prohibit the bringing of any cattle into such city, township or

district without inspection and a written permission, and may prohibit the running at large of animals in any township, if not already prohibited by law, for such time as the township board of health shall advise; and the state board of health may call upon local boards of health to discover and report cases of contagious disease and aid in measures for its abatement and prevention.

6. *And be it enacted*, That when any animal or herd of animals is held in quarantine under authority given by the laws of this state to the state board of health, it shall not be lawful for the owner or keeper thereof to add any animals to such herd, by purchase or otherwise, without the written consent of said board, under penalty of being adjudged guilty of a misdemeanor and fined therefor to an amount not exceeding one hundred dollars.

7. *And be it enacted*, That any person or persons refusing or neglecting to notify said board of health, or any one of them, of the existence of pleuro-pneumonia, rinderpest, or any other contagious or infectious disease among animals, shall be deemed and adjudged guilty of a misdemeanor, and upon conviction shall be punished by a fine of not more than two hundred dollars, or by imprisonment not exceeding one year, or both, at the discretion of the court; and that if any person or persons shall knowingly buy or sell or cause to be bought or sold any animal or animals affected with the pleuro-pneumonia, rinderpest, or any other contagious or infectious disease, or that has been exposed to a contagious or infectious disease, or is a part of any herd or stock held in quarantine, all such person or persons shall be deemed and adjudged guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine not exceeding two hundred dollars, or imprisonment not exceeding one year, or both, at the discretion of the court.

8. *And be it enacted*, That when, by reason of the locality of an infected animal or herd within a city, or by reason of frozen ground or extreme heat, it is, in the judgment of the state board of health, or those acting under its authority, inexpedient or impossible to bury any such dead or slaughtered animals on the premises, the board may authorize any veterinarian acting for said board to slash the skin and cut the flesh of the same, and, either under his direct oversight, or that of a city board of health, or contractor for the disposal of dead carcasses, to give over the same to the use of a bone-boiling or glue or other establishment for the disposal of dead animals, but in no case shall the same, or any part thereof, be disposed of for food, and any such disposal of the same shall make the party or parties concerned guilty of a misdemeanor and punishable by a fine not to exceed one hundred dollars, or imprisonment in the county jail for a period not exceeding six months.

9. *And be it enacted*, That if, between the first day of October and the first day of May of any year, a veterinarian who has been regularly graduated in veterinary medicine, desire to make a post-

mortem examination of any animal he has attended, or at the request of the owner of any animal that has died within the city limits, he may do so, if such examination is made within twenty hours of the death or slaughter of said animal; in every such case he shall notify the city scavenger, or remover of carcasses of animals, of the hour of his examination, and said scavenger shall arrange to remove the carcass in not more than three hours after the beginning of said examination.

10. *And be it enacted*, That it shall be the duty of the state board of health to keep a full and complete record of all the proceedings under this act and report the same annually to the state board of agriculture, and such report shall be printed in and form a part of the annual report of said board of agriculture.

11. *And be it enacted*, That the sum of two thousand dollars is hereby annually appropriated to the state board of health to defray the expenses of the said board in the duties imposed by this act, and that the governor, secretary of state and the comptroller be and they are hereby authorized to determine what sum annually shall be allowed to said board or any member thereof for services in the oversight and execution of the duties hereby imposed, but the amount allowed shall not exceed the sum of five hundred dollars in any one year.

12. *And be it enacted*, That if, on account of the prevalence of any contagious disease of animals, or the necessary guarding against the same, any greater expenditure shall seem to be required, the state board of health shall present the facts to the governor, the secretary of state and the comptroller, who shall authorize such additional amount as they may think necessary, but in no case shall the yearly amount thus authorized to be expended exceed five thousand dollars.

13. *And be it enacted*, That all bills for money expended under this act shall be audited by the comptroller of this state, and then submitted to the governor for his approval, and after being thus audited and approved by the governor, shall be paid by the state treasurer upon warrant of the comptroller.

14. *And be it enacted*, That the following acts, to wit: (1) A supplement to an act entitled "An act to establish a state board of health," approved March ninth, one thousand eight hundred and seventy-seven, which act was approved on the twelfth day of March, one thousand eight hundred and eighty; (2) A further supplement to an act entitled "A supplement to an act entitled 'An act to establish a state board of health,'" approved March ninth, one thousand eight hundred and seventy-seven, which supplement was approved March twelfth, one thousand eight hundred and eighty, which further supplement was approved on the twenty-third day of March, one thousand eight hundred and eighty-one; (3) A supplement to an act entitled "An act to establish a state board of health," approved March ninth, one thousand eight hundred and seventy-seven, which

supplement was approved March twelfth, one thousand eight hundred and eighty, and also a supplement to the further supplement to said act, approved March twenty-third, one thousand eight hundred and eighty-one, which supplement was approved March seventeenth, one thousand eight hundred and eighty-two ; (4) Supplement to an act entitled "An act to establish a board of health," approved March ninth, one thousand eight hundred and seventy-seven, and to supplements thereto relating to the contagious diseases of animals, which supplement was approved on March twenty-second, one thousand eight hundred and eighty-three, and all other acts and parts of acts, inconsistent with the provisions hereof, be and the same hereby are repealed, but any rights acquired under the said acts or either of them and any suits pending under the same shall not be affected by the repeal.

15. *And be it enacted*, That this act shall take effect immediately. Approved May 4th, 1886.

Our first report under this law is to be found in the report of the Board of Agriculture for 1879-1880 and subsequent reports, in each of the agricultural reports since. The law, when passed, no doubt had special reference to pleuro-pneumonia, but was wisely made general in its application and subject to the discretion of the Board. In case of any very extended outbreak of any disease among animals, it can call to its aid the Governor, Secretary of State and the Comptroller.

The Board at once (March 12th, 1880) turned its attention to contagious pleuro-pneumonia, availing itself of all the information gathered by those who had served under the special act of 1879. Although one hundred and ten herds were turned over to us, as in quarantine in the State, we were at once able to release over one hundred of them. In addition to dealing with each special case as the law provided (see Fourth Report), we deemed the following to be important service for the State :

First. To diffuse information that would enable owners to suspect contagion, and so separate the animals before others are infected. Also to acquaint owners with methods of disinfection and disposal, and of avoiding the carrying of the disease.

Second. To prevent the irresponsible introduction of cattle from infected districts by means of inspections, by regulative laws, and by holding sellers responsible. This includes interstate regulations.

Third. To provide means for the disposal of animals that have the disease, so that centers of contagion may not be preserved.

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Fourth. To guard against modes of keeping cattle which tend to cause ill health and diseased milk-supply.

Fifth. To authorize inoculation under State oversight in herds already affected, where it does not readily subside.

For the information of farmers and others we began issuing a series of circulars (A to H, inclusive—see bound copy of circulars of State Board of Health, 1890), which, in addition to the reports of the Board to the State Board of Agriculture, sought to give the best and most recent information as to the modes of preventing, and, in the earliest stages, recognizing and dealing with all contagious diseases of animals.

The communicable diseases of animals present a fast-widening field of investigation, not only in the interests of the animals themselves, and of their financial relations in successful agriculture, but also in their relation to human disease. Says Fleming: "Mankind has the aptitude to receive anthrax, rabies, foot and mouth disease, glanders, cow and horse-pox, diphtheria, and, in all probability, tuberculosis—not to mention the reception of entozoa and epizoa, entophytes and epiphytes, which give rise to morbid conditions, often of a most serious nature, in our own species." Between twenty and thirty parasitic diseases are claimed as communicable from animals to man, and the whole range of skin affections is being studied in their relationships.

It is the design of this circular to present in condensed form such of the contents of former circulars and reports as is of permanent value and such additional information as our most recent knowledge of the communicable diseases of animals furnishes, as also to acquaint Local Boards of Health and all owners of stock with our present laws and the modes of their application. We thus hope to aid in securing better care of animals both for the prevention and treatment of disease; to add to their comfort and that of their owners; to secure a wiser protection of meat and milk products and to increase the financial result from a department of agriculture and food-supply, so essential to the prosperity of the State. The diseases which we shall especially treat of are as follows:

AMONG HORSES.

- I. Glanders, or Farcy (the same disease).
- II. Influenza.
- III. Strangles or Throat Distemper.
- IV. Cerebro-spinal Meningitis.

AMONG CATTLE.

- I. Contagious Pleuro-pneumonia.
- II. Malignant Anthrax, or Splenic Fever (common also to other domestic animals).
- III. Texas Fever (perhaps a form of anthrax).
- IV. Husk, or Hoose.
- V. Tuberculosis.
- VI. Actinomycosis.
- VII. *Strongylus Micruris*, &c.
- VIII. Abortion.

AMONG SHEEP.

- 1. Sheep-pox (*variola ovina*).
- II. Contagious Foot-rot, Hoof-rot, or Foot-halt.
- III. Scabies (scab or itch).

AMONG SWINE.

- I. Swine Plague and Hog Cholera.
- II. Measles (from the larval form of tape-worm).
- III. Trichinosis (from the larval form of the worm *Trichinæ Spiralis*).

AMONG POULTRY.

Fowl or Chicken Cholera.

VARIOUS DISEASES NOT CLASSIFIED.

Hydrophobia.

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GLANDERS, OR FARCY.

These are different forms of the same disease transmitted chiefly, if not entirely, by a discharge from the nostrils getting upon a thin membrane or a raw surface. Possibly, in stables badly infected or by horses long inhaling each others' breath, some claim it may be contracted without coming in contact with an abraded surface. Mules seem even more susceptible than horses. It can be communicated to men, as in the Cape May county case, 1889. When so it is fatal. A specific bacillus has been found as a cause, or as always associated with it. Because animals suffering from it and especially from farcy are not at once laid aside from work, it is more apt to spread. Treatment never succeeds. The animal must be killed and the premises thoroughly disinfected. The following are the State laws in reference thereto:

LAWS AS TO GLANDERS.

An Act to prevent the spread of glanders in horses.

Section 1. Hereafter, if complaint be made to any justice of the peace of this state, verified by the oath or affirmation of the complainant, that any person or persons, body politic or corporate, have in his, her or their possession any horses, mares, geldings, asses or mules, having in or upon them the disease known by the name of "glanders," to order an inquiry and examination to be made of the condition of such horses, mares, geldings, mules or asses, under the supervision of some competent and skillful veterinary surgeon; and if by the report of the said surgeon it shall be made to appear to the satisfaction of the said justice, that such horse or horses, mare or mares, gelding or geldings, mule or mules, ass or asses, as is or are mentioned in the said complaint, is or are diseased with glanders, by his warrant, directed to the owner or owners, or person or persons having the same in possession, forthwith to destroy such horse or horses, mare or mares, gelding or geldings, mule or mules, ass or asses.

Sec. 2. Any person or persons who shall sell, expose to sale, or keep in his or their possession, or keep or suffer to be kept on his or their premises, or lead, drive or bring into any street, road or public place, any horse or horses, mare or mares, gelding or geldings, mule or mules, ass or asses, afflicted with glanders, knowing such horse or horses, mare or mares, gelding or geldings, mule or mules, ass or asses, to be so afflicted, shall be deemed guilty of a misdemeanor, and on

conviction thereof shall be punished by a fine not less than one hundred dollars and not exceeding five hundred dollars, or by imprisonment in the state prison not less than one month and not exceeding one year, or both, at the discretion of the court. (See Revised Statutes, Vol. I.; also, Chapter XLIX., Laws of 1884.)

A Supplement to an act entitled "An act to prevent the spread of glanders in horses," approved March thirty-first, one thousand eight hundred and sixty-four.

1. *BE IT ENACTED by the Senate and General Assembly of the State of New Jersey*, That in the event of the disease called by the name of "glanders," being known or suspected to exist in any locality of this state, it shall be the duty of all persons owning or having any interest in or having in their possession or under their control any horse or horses, mare or mares, gelding or geldings, ass or asses, mule or mules, having in or upon them, or being suspected to have in or upon them, such disease, forthwith to notify the local board of health or any member thereof that such disease exists, or is suspected to exist, and thereupon it shall be the duty of the said board of health to notify the state board of health, or some one designated by them, to investigate the same and quarantine said animal or animals and the premises where they are kept, and take such other precautionary measures as to any animal or animals sick, or as to other animals that have been or are in proximity thereto, as shall be deemed necessary, and to enforce such regulations as are provided for in the law to which this is a supplement or such additional regulations as in the judgment of said state board of health the exigencies of the case may seem to require, or if said board or any member thereof, without notification shall have any reason to believe that the said disease exists in or among any animals in this state, it shall have the same power of inquiry and examination and the same rights of jurisdiction as are herein provided where there has been notification by the owner or person having interest in or possession or control of such animals.

2. *And be it enacted*, That the said state board of health may call upon local boards of health to discover cases of the disease known by the name of "glanders," and to aid in provisions for their abatement.

3. *And be it enacted*, That for the purpose of quarantining animals the said state board of health or its representatives may take and retain in their control property, real and personal, of the owner or person having interest in or possession or control of such sick animal or animals to the extent and for the time necessary in the judgment of said state board of health or its said representatives to prevent the spread of such disease.

4. *And be it enacted*, That the said state board of health or any member thereof, whenever satisfied that any horse or horses, mare or mares, gelding or geldings, ass or asses, mule or mules is or are

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diseased with glanders, shall cause the same to be immediately destroyed, and all places in which said animal or animals have been kept, to be cleansed and disinfected and kept under quarantine until considered safe.

5. *And be it enacted*, That any person or persons refusing or neglecting to notify said board of health or a member thereof of the existence or suspected existence of the said disease known by the name of "glanders" among any of the animals aforesaid, shall be deemed and adjudged guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not more than five hundred dollars or by imprisonment not exceeding one year, or both, at the discretion of the court.

6. *And be it enacted*, That the governor, the secretary of state and the comptroller shall determine the amount to be allowed to said board, or any member thereof, for services in the oversight and execution of all things in and by this act required to be done.

7. *And be it enacted*, That this act shall take effect immediately.

Passed March 12th, 1884.

The courts have now fully established the responsibility of owners. They are under obligation to destroy the horse or mule as a nuisance and as dangerous. If they do not, they not only incur the penalty, but if horses belonging to others catch the disease they have to pay damages. Nor does it suffice to say that they did not know it was glanders, unless after detecting a sore in the nostrils, or a discharge of suppurating bunches at other points they have sought the opinion of some competent veterinary surgeon. The State authorizes us to see that the law is executed, that stables, harness, &c., are properly quarantined and disinfected, or, in cases of doubt on the part of the local veterinarian, we send an employe of the Board to examine the case.

In order that farmers and dealers may be able to know more fully when there is well-grounded suspicion, we subjoin, from the recent treatise of Hunting, the following description and details :

NATURE OF THE DISEASE.

Glanders is a contagious disease due to a specific poison in the system, and is capable of transmission to nearly all warm-blooded animals. That it is contagious is shown by its spread from horse to horse, in any stable where a decided case is permitted to remain. Direct experiment has proven its contagiousness over and over again.

If matter from the nose of a glandered horse be inserted into a wound on a healthy horse, glanders results. The discharge from the nose is not the only fluid from an infected animal capable of transmitting the disease. Many years ago it was demonstrated that the blood of a glandered horse transfused into the veins of a healthy one would produce the disease with great rapidity and certainty. Direct inoculation is not necessary for infection. The poison may enter the system through the stomach, through a mucous membrane, or even through the skin, and produces symptoms as definite as when introduced through a wound, or direct into the veins.

Glanders is transmissible not only from horse to horse, but to human beings, lions, tigers, mules, donkeys, dogs, goats and guinea pigs, but cannot be produced in cattle or in pigs.

It is customary to speak of glanders and farcy as two separate diseases, but it should never be forgotten that they are both due to the same poison, as is shown by the fact that the matter from a farcy-ulcer, when conveyed into the system of a healthy horse, may cause glanders, whilst the nasal discharge from a glandered horse may, by inoculation, produce farcy. In both diseases, too, we find that, when the external symptoms have existed for a long time, the condition of the lungs is alike. The identity of the two conditions is further shown by the termination of chronic cases in which glanderos disease of lung has existed for some time without any external signs. Such cases, as the result of a general shock to the system, may terminate in acute glanders, or, as the result of local injury to a limb, in farcy. The distinction between farcy and glanders is, then, one merely of the form in which a specific poison produces external signs, and not dependent upon any difference in the actual poison giving rise to the disease.

THE CAUSES OF GLANDERS, OR FARCY.

“Of all the contagious maladies affecting man or the domesticated animals, perhaps glanders is the disease which would be selected as an example of the spontaneous or direct development of a virulent or infecting element. Those who maintain that a contagious malady can never be generated, but that its appearance must depend on the presence of a previously-existing germ, have had but little or no experience among horses, or of this disease. The highest continental

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veterinary authorities, and those who have most attentively studied the etiology of the affection, are absolutely unanimous in their opinion as to its being at times developed directly, and without contagion having anything to do with it. The innumerable facts derived from many years' observation afford perfectly conclusive evidence that, under the influence of certain causes of an appreciable character, glanders will develop itself without the intervention of a contagium." So says Dr. George Fleming, in a book published only ten years since. It would be difficult to make a more positive or dogmatic assertion. I quote it merely to say that the learned author now knows better, and is one of our strongest supporters in the belief that glanders arises only as the result of one cause—contagion. That it never arises spontaneously, and cannot be produced by any cause, or combination of causes, which does not include the specific poison found in the blood and other tissues of an infected animal, is now the accepted doctrine of all the best veterinary authorities in this kingdom.

Glanders behaves like other contagious diseases—it spreads from one animal to another. It is most prevalent where the greatest facilities for contagion occur—*i. e.* when horses are brought together in large numbers and are constantly changing their position and their owners. It arises under conditions of the most opposite character, but always presents the same special signs of its existence in the animal affected. In every case the disease when once developed is contagious, and in all cases the poison, existing in the blood and discharges, is capable by inoculation of producing a similar disease in a healthy horse. Remember, then, these points—that the whole system of an infected horse contains a poison; that the smallest quantity of this poison is sufficient to infect another horse; and that the disease is always recognizable by specific symptoms and changes in the body. It is an undoubted fact that we can successfully inoculate a healthy horse with matter from a farcy-ulcer on the leg, or with glanders matter from the nose. We can also successfully induce the disease by transfusion of the blood, or insertion of the flesh, of a diseased animal, and thus prove beyond doubt the existence of a poison throughout the whole system. Only a very small quantity of the juices or fluids of an infected animal are necessary to communicate the disease, which then affects the whole animal as in the previous case. Now this shows that whatever the poison be, it has the power

to increase and multiply in the living horse. All substances having this power are living organized bodies—call them what you like—seeds, germs or organisms. Poisons such as arsenic have no powers of multiplication. A small quantity of the blood of an animal poisoned with arsenic would have no poisonous effect; the exact quantity administered remains in the system but cannot increase. Not so with an animal poison like that of glanders. It grows and multiplies, so that the few drops necessary to infect a healthy animal soon permeate the whole body, just as a piece of leaven leavens a mass of dough, and from that mass a small portion may again leaven a larger mass. The poison of glanders is, then, in its behavior exactly like a seed—capable of growth and increase when placed in suitable conditions. It still further resembles a seed in producing always definite results. The seed of turnips, or oats, or beans, when placed in suitable conditions always produces turnips, or oats, or beans. The poison of glanders always produces glanders. It never gives rise to strangles, or influenza, or mere blood-poisoning. The produce of a seed is always a definite plant, and the produce of glanders-poison is always a definite disease. We may safely assert, then, that the system of a glandered horse contains a definite specific poison, and we argue that if the poison be specific it can only arise from a similar poison derived from some source where such poison exists. At present we know of no other source than a previous animal infected with glanders. Thanks to Pasteur, and other scientific workers, we know that no object however small, possessing life, can be produced from dead material, that all life springs from previous life, and that living objects invariably derive their life from *similar* living objects.

We conclude, therefore, that the poison in the system of an animal suffering from a contagious disease can only arise from a similar poison; in other words, that a contagious disease can only be produced by the poison of the same disease, and therefore that glanders can only arise from a previous case of glanders. If this be true it ought to be possible to find and identify the specific poison of each contagious disease. As a fact this has been done in many diseases, and quite recently in glanders. Scientific men have detected the poison of glanders, they have separated it from the infective fluids of the diseased animal, watched its growth and increase out of the body in certain suitable conditions, and proved its identity by successfully inoculating healthy animals with the cultivated poison. This is the

positive evidence alone requisite to prove the theory which every other fact concerning the disease indicated as probable.

MODES OF INFECTION.

It is most important to understand how the poison obtains entrance to the systems of healthy horses; in other words, what are the various methods of infection. Direct inoculation into the blood-vessels we know is one way. This is often employed in the experimental production of the disease. Horses may also be infected through the fine membranes lining the eyelids or nose; through sores on the skin, such as exist in cases of cracked heels, broken knees, or even harness galls. The unbroken skin is very seldom the channel of infection, but it has been proven that if glanderous matter be rubbed into a sound skin it may be absorbed and cause the disease. In this way mangy horses may possibly infect themselves by rubbing against posts, bales or mangers upon which active poisonous matter has been deposited by diseased animals, and healthy horses, by the friction of their harness during work, may also become infected through the skin. One other important mode of infection there is, viz., through the stomach. Glanderous matter swallowed with the food or water is infective, and I believe this to be the most common mode of infection. Diseased horses sneeze into the mangers of other horses next to them, they infect nose-bags, drinking troughs and pails, and thus the special poison passes into the stomach, and from it into the circulation, where it rapidly grows and develops.

All horses are not equally liable to infection. Strong horses certainly become diseased, but they have a greater power of resistance than weak, debilitated ones. It is remarkable, too, that aged horses are not so liable to infection as young ones. Breed and sex seem to have no effect upon the disease, either as regards its commencement or duration.

All diseased horses are not equally infective. The nasal discharge from an old chronic case is not so deadly as that from a rapid and violent one—from what is called acute glanders. Scientific observers are able to explain this by showing us that the matter from chronic cases does not contain the same amount of special germs—bacilli. In acute cases the secretions are swarming with the bacilli. The scarcity or abundance of the bacilli in glanderous matter is the factor upon

which depends its power or virulency. Probably the failure of many experimental inoculations can be explained by this, and it helps us to understand how some animals in a stable become infected whilst others escape. Infection depends upon the admission to the blood of active bacilli—i. e. of living organisms special and peculiar to this disease.

SYMPTOMS.

The symptoms of glanders are very easily recognized when the disease is fully developed, but are obscure in the earlier stages. Glanders is sometimes very sudden in its appearance, and rapid in its course; at other times it rises gradually—almost imperceptibly—and is prolonged for months. The former cases are called acute, the latter chronic.

Acute Glanders.—The peculiar characteristic of acute glanders is the existence of fever in addition to the local signs of disease. The horse neglects his food, the pulse and respirations are quickened, and pain is evinced on pressure being applied to the sides of the chest. The glands under the jaw are swollen, there is a discharge of matter from the nose (usually from both nostrils), and the membrane lining the nostrils is of a dark brick-red color. Early in the course of this disease a careful examination of the nasal membrane will show one or more grayish spots raised above the level of the membrane. These raised patches soon alter. The surface gives way, and being removed in the discharge, leaves an ulcer of irregular shape, but always having a well-defined margin. The ulcers do not gradually run into the sound membrane, but are as distinct as if they had been punched out with a tool. They vary in size from a pea to a diameter of an inch or more. They show little tendency to heal, but spread rapidly, and extend, more or less, throughout the nasal passages, sometimes affecting the larynx and windpipe. The extensive ulceration very often leads to bleeding, and thus the nasal discharge becomes streaked with blood. Swelling of the nostrils, and thickening of the nasal membrane are common symptoms, and cause considerable interference to the passage of air, often giving rise to a roaring sound in the breathing, and often producing imminent suffocation.

These cases frequently run a very rapid course, ending fatally in a few days. The termination depends upon the strength of the animal

and the condition of his vital organs. When weakened by other diseases, or by the intensity of the accompanying fever, death soon ensues. When the lungs have long been the seat of glanderous changes, and the acute condition is only a development of old-standing disease, death takes place in two or three days, and a few cases run their course in twenty-four hours.

When death does not quickly end a case of acute glanders, the feverish symptoms abate, the constitutional disturbance gradually subsides, the discharge from the nostrils becomes less, and the swollen gland under the jaw decreases in size, or may even entirely resume its proper form. The ulceration on the nasal membrane ceases, the cavity of the ulcer is filled up by a new tissue, and a white cicatrix is left—a lasting memorial of the attack, and a caution to those who understand its significance. This apparent recovery is unreal, for the poison never leaves the system. As it circulates with the blood it permeates every tissue and organ, and there is one organ where it seems to find suitable conditions for quiet development. The lungs of a glandered horse never become free from the disease, although every external symptom disappear. In the lung, the specific poison of glanders may quietly develop and increase without any prominent sign of disease being noticeable for months, and in one case I have known this latent form to exist for two years after an acute attack of farcy—death revealing glanderous disease of both lungs to an extent I have never seen surpassed. As a rule, however, acute glanders is followed by chronic glanders—in other words, there remain some signs that the system is still infected, although no active departure from health is made evident.

Chronic Glanders.—It is not necessary for the production of chronic glanders that the acute form of disease shall have preceded it; in fact, the majority of cases arise in horses which have never shown any of the violent symptoms I have just described. A well-marked case of chronic glanders is characterized by a discharge from the nose—usually from only one nostril—and by an enlargement of the gland under the jaw.

The nasal discharge may be the first symptom to show itself, or the swollen gland may precede the discharge. When both conditions exist together they are found on the same side of the head. The discharge is not of any definite character. It may be watery, it

may be white and purulent, or it may even be snorted out in thick, lumpy masses. As a rule, it shows less color than other nasal discharges. If it has a peculiarity, it is its stickiness, which causes it to adhere to the edges of the nostrils, to the fingers of any one handling the nose, and to woodwork against which the animal rubs. It is seldom accompanied by any disagreeable smell, unless the lungs are badly diseased, and then the breath of both nostrils is equally fetid, especially after an attack of coughing. The idea that glanderous matter behaves differently in water to other purulent discharges is erroneous, and not to be depended upon as of the slightest assistance in distinguishing the disease. Sometimes the discharge is constant, but increased by exertion; sometimes it is intermittent, and only noticeable for a short time after the horse has been at work. Such cases are very dangerous, as they are infective, and likely to be overlooked. The discharge from a glandered horse's nostril is always contagious, whether constant or intermittent; whether white and mattery, or brownish and watery.

The enlargement of the gland under the jaw is peculiar. It remains hard, shows no tendency to suppurate, and becomes fixed pretty firmly to the jaw bone. The gland is lumpy and nodulated, not smooth and rounded; and this condition is more marked in old-standing cases than in recent ones. It varies in size from the slightest increase to the bulk of an orange, but is usually about as big as a walnut.

The nasal membrane, in chronic glanders, is always altered in color from the healthy pink to a bluey-gray, almost a leaden hue. This condition may be often noted before any other sign of disease is manifest. Of course it is, by itself, only suspicious, as it arises in other conditions of a harmless nature, but if it be seen in an infected stud, or associated with a suspicious history, or any other symptom, it should be sufficient evidence to warrant the separation of that animal for a time.

The nasal discharge and glandular enlargement are, sooner or later, accompanied by another sign—ulceration of the nasal membrane—which leaves no doubt as to the nature of the disease. It cannot, however, be too often repeated that this is not necessary to prove glanders. A horse may be glandered for months, and capable of infecting other horses, without any ulcer appearing in his nose. If we were always to wait for this one symptom, before treating a horse

as dangerously glandered, we should leave the majority of cases until the very last stage of the disease had set in. The glanderous ulcer when first seen is usually about the size of a pea. There may be one or more; they rapidly increase in size, and where they touch, join to form one large ulcer. It is seldom these ulcers heal, but when they do, a permanent white scar is left upon the membrane of the nose.

Accompanying these specific signs of chronic glanders we often have an unthrifty appearance of the animal, with more or less wasting of the body. Sometimes there is a cough—short, hollow, and when provoked, repeated. The cough may be induced by exertion, and depends upon disease of the lungs. Pressure with the knuckles in the spaces between the ribs will show soreness, and give rise to a “grunt.” When a horse that is not a “roarer” grunts on being threatened, there is always something wrong with the chest; and when in addition we find a nasal discharge, or enlarged gland, the probability is that the grunt signifies glanderous disease of the lungs. The skin is often what is called “hide-bound,” and the hair may be readily pulled out from manes and tails. Sometimes excessive stalling is noticed, and when the other horses in a stable are free from this condition, it is advisable to treat the symptom as suspicious, even if no other sign be apparent. As debility sets in, we frequently find a tendency for the legs to become “humory”—the legs below knee and hock presenting a thickened and puffy appearance. Chronic glanders ends in what horse-owners call a “break-up of the constitution”—the symptoms become more marked, fever sets in, and death from acute glanders soon follows. The expression implies an error, because no part of the body is unsound except that directly dependent upon glanderous disease.”

As to further dealing with it, and as to modes of disinfection, we cannot do better than insert the directions given by Surgeon Sternberg, U. S. A., in reply to a request from the Quartermaster-General of the Army:

“BALTIMORE, July 24th, 1888.

“*To the Quartermaster-General U. S. Army, Washington, D. C.:*

“GENERAL—In reply to your communication of July 19th, I have the honor to submit the following statements and opinions:

“Glanders is an infectious disease, in which the infectious agent has been demonstrated to be a living micro-organism, a bacillus.

"The bacillus of glanders was discovered by the German bacteriologists, Loeffler and Schutz, in 1882, and the discovery has since been confirmed by several other competent bacteriologists. It is found in the nasal secretions and ulcers of the mucous membrane, in the 'farcy-buds,' pustules and enlarged lymphatic glands of infected animals, and it is probable that it is also sometimes present in the urine.

"It is a slender rod, somewhat similar in appearance to the well-known tubercle bacillus, but more uniform in size and somewhat broader. In preparations stained with fuchsin or with Loeffler's solution of methylene blue, clear spaces are often seen in the rods, which have been thought by some authors to be spores, but this is doubtful, as Loeffler has found that no development occurs after the bacilli have been exposed to a temperature of 55° C. (131° F.) for ten minutes.

"Pure cultures of this bacillus have been shown to produce typical glanders in horses and asses, and it is recognized by bacteriologists as the cause of the disease. The disease may also be transmitted by inoculation to guinea pigs and field-mice, which animals (preferably guinea pigs) may be used as a test of the infectious character of the nasal secretions of a suspected animal.

"Exact experiments have shown that the bacillus of glanders is killed by exposure for five minutes to a 5 per cent. solution of carbolic acid, or by a 1 to 5,000 solution of corrosive sublimate.

DISINFECTION.

"In practice it will be best to rely upon boiling water for the disinfection of all articles which can be immersed in it without injury—rope halters, blankets, currycombs, bits, &c. To keep on the safe side, half an hour may be fixed as the standard time which articles to be disinfected shall be immersed in boiling water, or exposed to steam at a temperature of 212° F.

"Articles of leather should be repeatedly washed with a 5 per cent. solution of carbolic acid or a 1 to 1,000 solution of corrosive sublimate, or immersed in such a solution for at least one hour. If the solution can be used hot, say 180° F., without injury to the material, this will be desirable.

"All exposed parts of an infected stable should be thoroughly and repeatedly (three or four times) washed with a hot solution of one of the above-named disinfectants. The carbolic acid solution (5 per cent.) will be preferable on account of the poisonous nature of the solution of the bichloride of mercury; but the latter is less expensive, and under proper supervision there should be no special danger in using it. After its use, feeding-troughs, &c., should be thoroughly scrubbed with hot water, to remove all traces of the poisonous salt.

The application of a lime-wash to all surfaces, after complete disinfection, will be desirable.

"Stables occupied by infected or suspected horses should be disinfected daily by washing exposed surfaces with a 5 per cent. solution of carbolic acid, and nose-bags, halters, buckets used for drinking-water, &c., should be carefully washed with the same solution or with boiling water. In view of the reliability of known measures of disinfection, when properly executed, I do not consider it necessary or justifiable to destroy government property of value which has become infected by contact with animals suffering from glanders.

"I do not doubt the propriety of killing animals suffering from glanders or farcy as soon as the nature of the disease is recognized."

DIRECTIONS UNDER THE STATE LAW.

Any owner of horses suspecting this or any communicable disease in any one of his stock should at once seek the opinion of a skilled veterinarian. If he has any real doubt as to diagnosis the owner should be notified, before a witness, that it is his duty to prevent access of other horses or mules to his premises or contact with his stock, and the veterinarian should at once notify the State Board of Health or the Local Board of Health, which by law is called upon, if necessary, to co-operate with the State Board. If the disease is found to be glanders or farcy the animal should be killed and buried, so that no part of the body is less than four feet under the ground. The stables, &c., should be disinfected as directed by this circular or under the direction of a veterinarian. Whenever a veterinarian makes a diagnosis of glanders or farcy and the owner refuses to kill, the fact, with the address of the owner, should at once be certified to the State Board and Local Board of Health. In case of doubt or delayed action, the State sends a veterinary inspector, with authority to use prompt measures when required.

EQUINE INFLUENZA, PINK-EYE, &c.

An epizootic, or general influenza among horses has prevailed at various times in different countries. It has never prevailed so extensively in this country as it did in 1872-73, when, like a traveling

epidemic, it commenced in Canada and proceeded with quite equal pace toward the south until it extended over the entire United States and Mexico. While its origin is unknown, its communicability seemed to be established from the fact that horses escaped on those islands to which others were not brought from the mainland, and that animals kept away from others and not brought out of their stables, sometimes escaped. The best account of the epizootic and of its methods of treatment, is to be found in the history of it by Dr. A. B. Judson, Prof. Andrew Smith and Prof. A. F. Liautard, as contained in Vol. I. of the "Reports and Papers of the American Public Health Association," pages 88-109, and in the paper of Prof. James Law, as contained in the Report of the Department of Agriculture (U. S.) for 1872.

There was a slight recurrence of the disease in some parts of the United States in 1881-82, and in localities in this State it was quite common, although generally in a much milder form. It is a disease which has great variations in severity and in its class of symptoms and lesions. From the fact that the mucous membrane of the eye, in sympathy with that of the pulmonary organs, is often pink with a tinge of brown or yellow, it is frequently known as "pinkeye." This was its more common name as it prevailed in 1882. About the same time it prevailed extensively in Glasgow and other parts of Scotland.

In the almost universal extension of influenza among mankind, in 1890, it was often claimed that the human and animal diseases, if not identical, were allied. That in some localities they occurred at the same time is undoubted. In Saint Pancras, London, 1890, nine hundred horses were found affected. In many other places it was reported, but was by no means co-extensive. There was comparatively little of the disease among horses in 1890 and 1891 in the United States. Affection of the eye was not uncommon, and some authorities (Parson, Local Government Board, 1890) contended that the conjunctiva of the eye was the first part affected. A brief description of it by Professor Liéutard is as follows :

"On the evening of October 21st only a few animals were affected, but on the morning of the 22d there was scarcely an animal of the equine species that was not affected—horses, mules and even a zebra. More than twenty thousand were suffering in different degrees, and it became apparent that the disease was influenza of the catarrhal form, fortunately not serious or fatal."

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The symptoms as presented were, with a few exceptional cases, rigors, febrile action, impaired appetite, sneezing, cough, nasal discharge, accelerated respiration, weak and compressible pulse and dry fæces. The attack was very sudden; the animal would be apparently well in the evening and sick in the morning; there was an abundant discharge from the nose; the temperature per rectum was often as high as 105° F.; loss of appetite being one of the premonitory symptoms, and the movements of the animal were feeble and staggering. The skin was dry and the hair dull and staring.

"The duration of the mild form is from two to three weeks, after which the animal can resume work, though in a few cases the symptoms disappear in eight or ten days.

"The most common complications were thoracic pleurisy and pneumonia, destroying a large number of animals. The nervous system was affected in a few cases; in the form of spinal meningitis in these, the result proved quite satisfactory."

The following outline and treatment of the disease as given by W. M. Anderson, Jr., before the Scottish Metropolitan Veterinary Medical Association, will serve as a valuable guide:

"The disease presents itself in several forms, which may be classified under four heads, viz., catarrhal, œdematous, rheumatic and irregular. In all four forms the primary symptoms are alike, namely, dullness and languidness, then loss of appetite. At this stage we can, as a rule, determine what form the disease will assume. If catarrhal, the animal has a slight cough, tumefaction of the submaxillary glands with watery discharge from the nostrils, and the usual febrile symptoms, namely, increased temperature and rapid pulse; the conjunctiva has a yellowish appearance, and all the mucous membranes visible are injected. The pulse is seldom over eighty, more frequently ranging from fifty-five to sixty-five, the temperature varying from 101° to 105° F.

"I consider the disease takes four days, as a rule, to mature, at which stage the foregoing symptoms are increased. The previously injected mucous membranes become yellow; the animal gets very weak, in fact, staggers greatly; rapid emaciation sets in, still there is no inclination to feed, and it seldom lies. This state of matters generally continues for two or three days before convalescence sets in. The first convalescent symptoms are the eye brightening up and the animal showing an inclination to feed. It is astonishing how soon the patient recovers and convalescence sets in; the symptoms disappear as rapidly as they appeared, and in a few days the animal is apparently in good health. The fatal terminations of this form of

the disease are generally due to pleurisy or gangrene of the lungs. When the disease assumes the oedematous form, after the primary symptoms the eyelids swell, then the legs—more especially the hind ones—tumefy considerably, and the sheath, as a rule, is greatly swollen. There are the usual febrile symptoms, with quick, weak pulse, and urine high colored, and often, but scantily, passed.

“The mucous membrane is infiltrated with a yellow fluid; there is great thirst, but no inclination to feed; rapid emaciation sets in, and in a number of cases diarrhœa is present. This form of the disease also takes about four days to mature. The eyelids are then completely closed, the pulse generally ranging from eighty to one hundred, the temperature from 102° to 105°. As a rule, several days elapse before convalescence sets in, and recovery is much slower than in the preceding form. Should death take place, it is generally through sheer prostration.

“In the rheumatic form, which I must say is the most peculiar, we have loss of appetite and the mucous membrane injected; there is great lameness in one or more limbs, oftenest in the off fore, without any apparent cause. The animal has an anxious look, as if suffering acute pain. The febrile symptoms are present, accompanied by an intermittent pulse; the lameness sometimes changes from one limb to the other; the back is in some cases ‘roached,’ and when the animal is moved it generally inclines to one side or the other. There is a difficulty in micturition, and the urine is highly colored. This form takes about ten days to run its course; and often the lameness continues for several days after the other symptoms have disappeared.

“The fourth form, which I have called ‘irregular,’ includes all the complicated forms of the disease. The usual symptoms of fever and jaundice are present, but in some cases we have diuresis accompanying them, in others partial paralysis, again in others colicky pains, all of which require different treatment, according to their respective symptoms. I cannot say much regarding the post-mortem appearances of this disease, as I had only one opportunity of witnessing an examination of a horse which was said to have died from the disease, and from all appearances emaciation was the cause of death. However, the mucous membrane all along the intestinal tract was infiltrated with a yellow fluid, and the liver was enlarged. My treatment for this disease of course varied according to the symptoms present; but in every case in which fever existed the first thing I did was to rub the whole surface of the body with *acetic acid and water*. If the animal had a fine skin I mixed one part of the acid with two of water, but with draught or coarse-skinned animals I used equal parts. After rubbing the body and legs with this mixture, I ordered the animal to be well wrapped up in several blankets, from the head backwards, and the limbs to be bandaged; I also put half an ounce of nitrate of potash and fifteen minims of Fleming’s tincture of aconite in half a pailful of cold water, and allowed the animal

to drink it as he pleased. After the blankets had been on an hour I had them removed, and usually found the animal perspiring profusely. Having had him rubbed dry, and applied soap liniment to his throat and region of the liver, dry blankets and bandages were put on, and he was removed to a comfortable box or stall. The only food I allowed him was a few *sliced carrots*, mixed with some wet bran, and a handful of oats three or four times a day. In the catarrhal form I generally applied the liniment to the throat twice a day, and in a few cases had to blister the throat with cantharides. I kept water with aconite and potash constantly before him, allowing him three to five doses in the twenty-four hours. However, after the first administration I limited the dose to two drms. nit. potass., and ten mims. aconite. If the fever continued, without showing signs of abatement, twenty-four hours after my first visit, I again applied the acetic acid and water.

"When I feared the disease extending to the chest I applied a counter-irritant, and gave sulph. ether two ounces and camphor two drms. twice daily. In the oedematous form, besides applying the acetic acid and water to the body, and the liniment to the throat and region of the liver, I ordered his legs to be rubbed with mustard and water, the strength being one-quarter pound of mustard to a gallon of water, and then bandaged. I also gave mineral tonics in the form of balls.

"In the rheumatic form I gave two drms. salicylic acid twice daily, and applied acetic acid to the affected limb or limbs. In the irregular form my treatment, of course, varied. When diuresis was present I substituted carbonate of soda for nitrate of potash, and gave plenty of mashed linseed, also occasionally giving two drms. iodide of potassium. When partial paralysis presented itself, I gave sulph. quinine and nux vomica. My opinion regarding the treatment of this disease is, that good nursing and comfort have more to do with the recovery of the patient than all the medicine we may prescribe."

STRANGLES, OR HORSE DISTEMPER.

Various forms of throat malady are known by this name. Catarrh of the membranes of the upper air-passages and swelling of the glands about the jaw and tendency to pus formation are usual. Different epizootics of it differ much, or it is sometimes mild and sometimes very malignant.

The following description from the Bureau of Animal Industry is valuable:

“STRANGLES—COLT DISTEMPER.

“*Synonyms: Distemper, colt-ill, catarrhal fever, &c.*

“DEFINITION.

“Strangles is an infectious disease of the horse, mule and ass ; seen most frequently in young animals, and usually leaving an animal which has had one attack protected from future trouble of the same kind. It appears as a fever, lasting for a few days, with formation of matter or pus in the air-tubes and lungs, and frequently the formation of abscesses in various parts of the body, both near the surface and in the internal organs. It usually leaves the animal, after convalescence, perfectly healthy and as good as before, but sometimes leaves it a roarer, or is followed by the development of deep-seated abscesses which may prove fatal.

“The cause of strangles is contagion by direct contact with an animal suffering from the disease, or indirectly through contact with the discharges from an infected animal, or by means of the atmosphere in which an infected animal has been.

“SYMPTOMS.

“The horse at first is a little sluggish if used, or when placed in the stable is somewhat dejected, paying but moderate attention to the various disturbing surroundings. Its appetite is somewhat diminished in many cases, while in some cases the animal eats well throughout. Thirst is increased, but not a great deal of water is taken at one time. If a bucket of water is placed in the manger before a patient, it will dip its nose into it and swallow a few mouthfuls, allowing some of it to drip back and then stop, to return to it in a short time. The coat becomes dry and the hairs stand on end.

“At times the horse will have chills of one or the other leg, the fore quarters or hind quarters, or in severe cases of the whole body, with trembling of the muscles, dryness of the skin, and its hairs standing on end. If the eyes and mouth are examined the membranes are found reddened to a bright rosy color. The pulse is quickened and the breathing may be slightly accelerated. At the end of a couple of days a cough is heard and a discharge begins to come from the nostrils. This discharge is at first watery ; it then becomes thicker, somewhat bluish in color and sticky, and finally it assumes the yellowish color of matter and increases greatly in quantity.

“At the outset the colt may sneeze occasionally and a cough is heard. The cough is at first repeated and harsh, but soon becomes softer and moist as the discharge increases. Again the cough varies according

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to the source of the discharge, for in light cases this may be only a catarrh of the nasal canals, or it may be from the throat, the wind-pipe, or the air-tubes of the lungs, or even from the lungs themselves. According to the organ affected the symptoms and character of cough will be similar to those of laryngitis, bronchitis or lung fever caused by ordinary cold. Shortly after the discharge is seen, a swelling takes place under the jaw, or in the intermaxillary space. This is at first puffy, swollen, somewhat hot and tender, and finally becomes distinctly so, and an abscess is felt, or having broken itself the discharge itself is seen dripping from a small opening.

"When the discharge from the nostrils has fully developed the fever usually disappears and the animal regains its appetite, unless the swelling is sufficient to interfere with the function of the throat, causing pain on any attempt to swallow. At the end of four or six days the discharge lessens, the soreness around the throat diminishes, the horse regains its appetite, and in two weeks has regained its usual condition.

"Old and strong horses may have the disease in so light a form that the fever is not noticeable; they may continue to eat and perform their ordinary work as usual, and no symptom may be seen beyond a slight discharge from the nose and a rare cough, which is not sufficient to worry any but the most particular owner. But, on the other hand, the disease may assume a malignant form or become complicated so as to become a most serious disease, and even prove fatal in many cases. Inflammation of the larynx and bronchi, if excessive, will produce violent, harsh coughing, which may almost asphyxiate the animal. The large amount of discharge may be mixed with air by the difficult breathing, and the nostrils, the front of the animal, manger and surrounding objects become covered with a white foam. The inflammation may be of the lung itself (lobular pneumonia), and cause the animal to breathe heavily, heave at the flanks, and show great distress. In this condition marked symptoms of fever are seen; the appetite is lost, the coat is dry, the horse stands back in its stall at the end of the halter-strap, with his neck extended and his legs propped apart to favor his breathing.

"This condition may end by resolution, leaving the horse for some time with a severe cough, or the animal may die from choking up of the lungs.

"TREATMENT.

"Ordinary light cases require but little treatment beyond diet, warm mash, moistened hay, warm coverings, and protection from exposure to cold. The latter is urgently called for, as lung complications, severe bronchitis and laryngitis are often the result of neglect of this precaution. If the fever is excessive, the horse may receive

small quantities of Glauber salts (a handful three times a day) as a laxative, bicarbonate of soda or niter, in dram doses, every few hours, and small doses of antimony, iodide of potash, aconite or quinine. Steaming the head with the vapor of warm water poured over a bucket of bran and hay, in which belladonna leaves or tar have been placed, will allay the inflammation of the mucous membranes and greatly ease the cough. The swelling of the glands should be promptly treated by bathing with warm water and flaxseed poultices, and as soon as there is any evidence of the formation of matter it should be opened. Prompt action in this will often save serious complications. Blisters and irritating liniments should not be applied to the throat. When lung complications show themselves, the horse should have mustard applied to the belly and to the sides of the chest. When convalescence begins great care must be taken not to expose the animal to cold, which may bring on relapses, and while exercise is of great advantage, it must not be turned into work until the animal has entirely regained its strength."

CEREBRO-SPINAL MENINGITIS.

This has not been proven to be an infectious or contagious disease, yet it often appears in a locality and spreads to several horses in the same stable or along a line of farms. It has some resemblance to the human disease known as cerebro-spinal meningitis, which has similar local outbreaks. The disease, as it appears among horses, seems first to have been described by Dr. J. Michener, about 1860, under the name of paralysis of the par vagum.

Prof. Large, of Brooklyn, gave it its present name.

It seems to have a specific course, and is by some attributed to some fungus on grains or grasses.

We copy as follows :

"SYMPTOMS.

"The symptoms which typify sporadic or epidemic cerebro-spinal meningitis in man are seldom witnessed in equal distinctness among horses, viz., excessive pain, high fever and early muscular rigidity. In the recognition of the severity of the attack we may divide the symptoms into three grades.

"In the most rapidly-fatal attacks, the animal may first indicate it by weak, staggering gait, partial or total inability to swallow solids or liquids, impairment of eyesight, twitching of muscles, and slight cramps may be observed.

"This is soon followed by a paralysis of the whole body, inability to stand, delirium, in which the animal sometimes goes through a series of automatic movements as if trotting or running; the delirium may become very violent and the animal, in its unconsciousness, bruise his head in his struggles very seriously, but usually a deep coma renders him quiet until he expires. Death in these cases usually takes place in from four to twenty-four hours from the time the first symptoms become manifest.

"The pulse is variable during the progress of the disease; it may be almost imperceptible at times, and then again very rapid and irregular; the respirations generally are quick and catching. When attacked in this rapidly-fatal form we may be able only to distinguish it from encephalitis when other animals in the same stable or neighborhood are similarly affected. In the next form in which it may develop it first becomes manifest by a difficulty in swallowing and slowness in mastication, and a weakness which may be first noticed in the strength of the tail; the animal will be unable to switch it or to offer resistance when we bend it up over the croup. The pulse is often a little slower than normal. There is no evidence of pain; the respirations are unchanged, and the temperature little less than normal; the bowels may be somewhat constipated.

"These symptoms may remain unchanged for two or three days and then gradual improvement take place, or the power to swallow may become entirely lost and the weakness and uncertainty in gait more and more perceptible; then sleepiness or coma may appear; the pulse becomes depressed, slow and weak, the breathing stertorous, and paroxysms of delirium develop, with inability to stand, and some rigidity of the spinal muscles or partial cramp of the neck and jaws. In such cases death may occur in from six to ten days from the commencement of the attack. In many cases there is no evidence of pain, spasm or fever at any time during the progress of the disease, and finally profound coma develops and death follows, painless and without a struggle."

DISEASES AMONG CATTLE.

CONTAGIOUS PLEURO-PNEUMONIA.

We notice this first, not because it is the most fatal or the most prevalent of the diseases of cattle, but because in this country and in this State it led to the first prominent legislation as to contagious diseases of animals.

It is often known as lung plague, but should not be called cattle

plague, as that name is generally used in reference to rinderpest—a different and more dread disease, which has so often ravaged Europe but has never appeared in this country.

The earliest traces of pleuro-pneumonia seem to place it in Central Europe, but nothing definite is known of it till 1769. From that down to 1789 the malady appeared to have been confined to the mountainous regions of Switzerland (Fleming), but the increased commercial relations of countries soon carried it to other districts. It invaded Prussia in 1802 and soon spread over North Germany, reaching Great Britain in 1841 and the United States (Brooklyn) in 1843, New Jersey in 1846 and Massachusetts in 1859.

According to Dr. Chas. Michner the following is its earliest history in New Jersey :

“It first broke out in 1847, in the herd of Mr. Thomas Richardson, he first finding it among his imported stock, and knowing its malignancy, immediately resorted to occision, at a very great sacrifice, thereby stamping it out. Again, in the summer of 1855 (six years before it made its appearance in Massachusetts), J. L. Jacobus bought twenty head of cattle in New York, which he turned into pasture three miles from Chatham, N. J. In about three weeks, in going to look after the herd, he found two had died and two more were very sick. The remaining fifteen did not develop the disease. At about the same time, Dr. Munn, of Chatham, N. J., purchased some cattle from an apparently healthy lot, which he yarded with his other stock, when the disease made its appearance among his other cows, some of which soon died. From Dr. Munn’s herd the disease was communicated to that of Mr. Lunn, who also lost several animals. Mr. Abraham Johnson, living near Newark, also purchased some cattle in New York which developed the disease in a short time after he brought them to his farm.”

Dr. Corlies, in the same report, gives the following statement :

“In 1843 there came from Europe in a steamer a cow kept for the purpose of supplying the passengers and crew with milk. Upon arrival, she was sold in Brooklyn, where she went into a stable among a number of other cows, some of which soon presented unmistakable signs of malignant pleuro-pneumonia. As they were disposed of to the butcher the malady did not spread. That case marks the advent of the disease in the United States. We are informed it made its advent in Camden county in 1858, and in Gloucester in 1859. At that time it was raging extensively in Massachusetts. Mr. J. E. Hancock, of Burlington county, bought some cattle in Philadelphia, in 1861, which introduced the disease in his herd.”

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The outbreak in Massachusetts, 1859 and 1860, was so serious that the Legislature appointed a special commission and the disease was stamped out at considerable expense. It did not excite much attention or have increase in this State until it appeared in Essex and Union counties in 1872, and in Burlington, Camden and Ocean counties about the same time. It was on account of its prevalence in Philadelphia and of many sporadic but severe outbreaks in 1878-79, that the Legislature made it the subject of a special law. Its history under that act is given in two brief reports, and ever since the chief State information as to it is to be found in our reports to the State Board of Agriculture and to the State Board of Health.

PERIOD OF INCUBATION OF PLEURO-PNEUMONIA.

The period of incubation has not yet been accurately determined, but must be admitted to reach from ten to forty days, as a rule. We believe we have evidence of its occurrence three months after the purchase of an infected animal. This is the great difficulty in eradicating the disease. An animal may easily pass in an ordinary inspection, and yet be a conveyancer of the disease. It is for this reason that we regard the usual inspections, as they have always been conducted, entirely insufficient to guard against the disease. Acute cases only are likely to be discovered, and drovers soon become wise enough not to bring these over by usual routes. While there should be full powers of inspection, this cannot be the sole or chief reliance. So long as pleuro-pneumonia exists in any part of any State, every man who brings any cattle in the State, should be required to define the locality from which they came, and give a certificate of health, and be held accountable for any outbreak in the animal for three months. All newly-purchased stock should be kept apart from the common herd. Any slight cough or other ill condition of health should be carefully watched.

SYMPTOMS OF THE DISEASE, ETC.

The attack usually begins with coldness, and dry, hacking cough, with symptoms of pain and uneasiness. The animal refuses food. Milch cows diminish in milk. Even an unskilled man, knocking

with the fingers against the opposite sides, back of the shoulders, will detect the difference in sound of the two sides.

Both the fever and heat are marked. Many of the symptoms correspond with pleurisy or pneumonia in man—with the same varied severity, and with either acute or chronic stages. If *new cattle* have come into the herd, or if the disease is prevalent near by, there is more ground for suspicion.

It varies much in intensity, cattle sometimes dying in two or three days. Other survive for months, with symptoms of pulmonary disease more or less distinct.

To an observer of a post-mortem where an animal is killed with pleuro-pneumonia and has one sound lung, the contrast at once convinces of something—one lung is say of two and a half pounds weight, the other of twenty to thirty pounds. There is effusion of a liquid—there is a thickened pleura, both of the part next to the chest wall and of that covering the lungs. There is plastic exudation, both inter-pleural (L.) and in the interstices of the connective tissue, which leads to consolidation or gives all the consistency of fibrinous exudation. It is just this that constitutes the pathology or lesion of the disease. "All the other organs of the body are, as a rule, found to be in a state of health." There is variation in the amount and consistency of the watery or gluey fluid, after the plastic exudation so rapidly organizes as to bind down the pleura and lung so that you need to peel it from the chest wall.

The pneumonia is chiefly interstitial and magnified because of the abundant connective tissue in the cattle. Neymeyer's definition of interstitial pneumonia (Vol. I., pp. 162 and 192) as an inflammation, involving the walls of the air vesicles and the inter-lobular connective tissue, "is fully descriptive as to kind." Only the amount is magnified because the bovine animal has so large an amount of connective tissue in the lung, and because the "pneumonic lobules are separate blocks of tissue." By the exudation and by the conversion of the inter-lobular tissue into granulative tissue and connective tissue, the lobules themselves pass to a stage of stuffing or impaction, and so you get necrosis or a strangulated death of the lung substance.

If the animal does not die, but goes on to recover, the dead portion of the lung becomes encapsulated or encysted by "the false membrane over the pleura, and the inter-lobular and peribronchial spaces."

Now in all this, as to the pathology of the lesion, so far as quality

or method of change is concerned, we have nothing pathognomonic or distinctive of an infectious or contagious malady. As we read or study, side by side, the various changes that take place in pleuro-pneumonia, or chronic interstitial pneumonia, in the adult and in the animal, the terms of description and the records of lesion as to the character of the exudation, its organization, changes and results, it is hard not to come to the conclusion that Leaming does, that if there is a contagious pleuro-pneumonia in animals there is also an analogous infectious pleuro-pneumonia in adults, and between the two, as he finds them in the adult, he makes only such pathological distinctions as these. In one, the pneumonitis is the principal lesion; in the other, the inter-pleural plastic exudation. "He makes the essence of distinction to consist in the more excessive and intense hyperplasia of the blood, its tendency to throw out plastic or fibrous exudation being such that wherever there is connective tissue there is plastic exudation."

While the medical profession generally recognize cases of common pneumonia, to which all these facts attach, it is significant that most regard it not as a contagious disease, although, at times, largely prevalent, but as a severe and malignant type of usual pneumonia, which is also generally a pleuro-pneumonia.

While some veterinarians have asserted to us that it is possible from the post-mortem lesions of the lung alone, to pronounce a case one of infectious pleuro-pneumonia, yet on presenting the specimens to five of the most eminent pathologists of New York City, three of whom have examined cattle lesions also, they plainly declared that while from the rapid plastic or pleuritic exudation and its "tremendous" rapidity of solidification, there might be grave suspicion and inference that the disease was specific, yet that the same pathological order of change was common and not distinctive. The very points that had been named to us as differential, were shown not so to be by those who believe in a contagious pleuro-pneumonia.

Some have supposed the very extensive exudation into the lung structure and its marbled appearance, are indicative of some specialty in the inflammatory process; this is not, however, the case, for it is found that ordinary pneumonia, caused by cold, induces the same anatomical condition of the pulmonary parenchyma—the peculiar appearance being due to the anatomical fact that the lungs of horned cattle contain much connective tissue and that the air cells are separated into groups by such connective tissue.

Prof. Williams, of Edinburgh, in his "Principles and Practice of Veterinary Medicine," quotes Strangemayer with approval, thus :

"All this, however, is not intended to and does not discredit the idea of contagion. The same structural or tissue changes occur to an organ from causes totally different. So pneumonia, arising from very different causes, does not have lesions corresponding to the variety of causes. Puerperal fever, although so distinctly communicable, so far as the peritonitis is concerned, has no distinct lesions. Although the pleural adhesion and infusion are marked, yet common pneumonia is generally pleuro-pneumonia."

Loomis has said that in pneumonia nothing is so frequent as adhesion of the lung to the pleura.

Prof. Janeway states that in one hundred and twelve cases of post-mortem of pneumonia, only ten were found entirely free.

While there is a field for the comparative study of the lesion, it is not chiefly as to its pathological distinctness.

How, then, is a diagnosis of the disease to be made out? We have only to answer that it is by the history of the cases, the ability to trace to a source of contagion, the rational and physical signs, the spread of the disease, the degree of lesion and the post-mortem appearances. The rapidity of the exudation and interstitial consolidation is an important index. Influenza or pneumonia may be occurrent when there are also cases of contagious pleuro-pneumonia. The infectious disease never occurs without being derived from a previous case. It is the summary of evidence rather than any one symptom. The imparting of the disease to other animals by inoculation from a diseased lung, as a crucial test, is worthy of trial.

WHAT CAN BE DONE TO PREVENT OR ERADICATE CONTAGIOUS PLEURO-PNEUMONIA ?

The answer which our State law gives to the question is, "Kill the diseased animal and separate and watch the rest of the herd until the danger is past." The disease is not one for which any successful treatment is known. Early slaughter is always desirable. In pursuit of this policy the State authorities were able to restrict the disease. While it would often extend to others of the herd, we had no instance of its reaching cattle that had not been in close proximity to those affected.

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As additional means now adopted are not always quickly within the reach of cattle-owners, and as disinfection is often needed, we repeat the circular of precautions and directions issued some time since :

No farmer or stock-raiser should make additions to his herd, unless he can trace the animal purchased and receive a warranty that there has been no exposure. Where cattle are bought, it is well to keep them at least six weeks from mingling with the general herd. Any affected animal is at once separated.

Where the disease has manifested itself, we recommend the erection of temporary sheds, and a thorough disinfection of all stables and sheds. Chloride of zinc is advised to be used for the sponging of the nostrils *both of the sick and well cattle*, where the disease has appeared.

An ounce bottle of the solid chloride, costing ten cents, can be dissolved in a gallon of hot water, and from a half gill to a gill in all be given in the drinking-water at different times each day. Common tar smeared in the nostrils is of service.

It is best to heap all manure outside of the buildings and to sprinkle hay or straw which has been used, with some disinfecting solution and remove it and whitewash the buildings. Add four ounces of dry chloride of lime to each gallon of whitewash. For sprinkling, commercial sulphuric acid and water in the proportion of one pint of the acid to eight gallons of water is valuable.

Sulphate of iron (green vitriol, or copperas) costs two cents per pound, and a pound to a gallon of water answers well for sprinkling over surfaces that have been exposed.

"Calx powder," made by powdering one bushel of dry charcoal and two of stone lime and mixing them, is also a good corrective.

Sirel's compound consists of—

Sulphate of iron (green vitriol, or copperas), 40 pounds.

Sulphate of lime (gypsum, or plaster of Paris), 50 pounds.

Sulphate of zinc (white vitriol), 7 pounds.

Bone charcoal (ivory black), 2 pounds. (Or 6 pounds of dry wood charcoal.)

This may be sprinkled dry over places exposed to moisture.

What is known as the "lime and salt mixture" is not only valuable agriculturally as an addition to compost, but has valuable disinfecting and deodorant properties. It is prepared by adding one bushel

of salt to three bushels of fresh-slaked lime. Stir it frequently until the mixture becomes moist, and then add to it twice the amount of loose, dry earth. This may be scattered freely over the ground where the cattle have been kept or have pastured.

In addition to directions in former circulars, the English law directs, first, the removal of all litter and other matter, and thorough cleansing of stalls; second, "the application to the floor and to all parts above the floor with which animals or their droppings have come in contact, of a coating of lime, made by mixing good, freshly-burned lime with water, and containing in each gallon of lime-wash either one-fifth of a pint of commercial carbolic acid or one-fifth of a pint of cresylic acid or four ounces of fresh, dry chloride of lime, such lime-wash to be prepared immediately before use."

During heavy winds or storms, all doors and windows of empty sheds should be fully opened, so that stalls and all parts may be flushed with air. There is much need of attention to the airing of stalls when the cattle are out of them.

There is reason to believe that many farms where pleuro-pneumonia has once occurred have had new outbreaks months after, in removing straw or hay, or by, in some way, stirring up infective particles which had been concealed. There is great encouragement to seek its prevention, since the disease is believed never to occur in this country except as it is caught from some previous case or from exposure to the immediate grounds or buildings where the disease has before existed.

Farmers and dealers need to be watchful, and whenever any of their cattle seem ailing they should at once be separated from the rest. If they have good reasons to suspect it to be pleuro-pneumonia, or if the local veterinarian so pronounces it, there must be no delay in notification as required by the law.

Local Boards of Health may often be consulted with advantage. Where the disease prevails they are especially charged with the duty of preventing its spread.

They are the appointed guardians of the welfare of their respective towns and townships, and for mutual protection should aid in preventing the spread of so serious a disease.

Cattle must not run at large in townships in which it prevails. The milk from ailing cows should not be sold. Although there are no records of the disease from this source, yet common judgment teaches us that animals that are feverish and sick cannot furnish good milk.

Cattle that recover from pleuro-pneumonia are generally left with one lung diseased, and they should be fattened. The disease thus far overcome does not affect the meat. As some believe that an animal once having had the disease may have an outbreak again from the diseased lung, it is better to fatten any animal that has been known to have had pleuro-pneumonia and has recovered. Under this system the disease, for several years, did not increase in the State. The weakness of the method was only in two particulars: (a) often many of the herd which the disease had invaded had the disease, and (b) because of its introduction, especially from the stock-yards of New York and Philadelphia, new outbreaks would occur after centers of contagion had been broken up.

To reach the first, the law next provided for inoculation of animals in herds where the disease had appeared.

Dr. R. Rutherford, of Edinburgh, in his papers in the June and July (1882) numbers of "Fleming's Veterinary Journal," says:

"1. Inoculation is based upon the theory of pleuro-pneumonia being an eruptive fever.

"2. Inoculation is the application to a healthy animal of the virus of pleuro-pneumonia.

"3. Inoculation does not produce pleuro-pneumonia.

"4. An inoculated animal does not infect another animal.

"5. An inoculated animal cannot contract pleuro-pneumonia.

"6. The time occupied by the operation is from four to eight weeks.

"7. Inoculation in the case of milch cows does not materially interfere with their milking.

"8. Inoculated animals thrive better after the operation, and are stronger and freer from other ailments than those not inoculated.

"9. The loss arising from the operation need not exceed two per cent.

"10. From the fact that an inoculated animal is exempt from the disease, and that the average time required to develop and mature an inoculation is from fourteen to twenty-one days, that period may be accepted as the time required to arrest an outbreak."

He insists upon exact methods of procuring, preserving and inserting the lymph. His success fully justifies the provisions of our present law, while it shows the inadequacy and danger of the operation in unskillful hands.

Its merits are more fully set forth in an article to be found in the

Seventeenth (1889-90) Report of the New Jersey State Board of Agriculture, pp. 312-324.

It is not without careful knowledge and some valuable experience of farmers in the State that the permit of inoculation was added to the State law.

Its working was satisfactory, and the only embarrassment remaining was that arising from interstate traffic. We are aware that both the method of the English Government, as well as our own, is to rely upon occision or slaughter alone, and therefore to discourage or prevent inoculation. Yet the fact of its efficiency remains. The reason for this preference is yet the subject of discussion, and its practicability still needs confirmation.

About this time (1888) the threatening of pleuro-pneumonia in other States, and especially the asserted risk of its spread to the ranches of the extreme West, led to governmental legislation with the view of treating the disease as an exotic or foreign disease, and of stamping it out from the country.

Whatever may have been our personal views or those of the Board as to the efficiency of present methods—if only the general government would furnish interstate and border patrol and protection—it seemed best at the instance of the general government to confer with the Governor and Attorney-General as to how far we ought to transfer authority or co-operate with national authority in the eradication of the disease. The result was that in January, 1888, a definite plan was arranged by which pleuro-pneumonia in this State should be dealt with by the general government under the national law, owners being compensated by United States authorities.

The reserve made by the State was that quarantine should in all cases emanate from the State Board of Health; that any aggrieved parties might appeal to it, and that no well cattle in exposed herds should be killed except as agreed upon by owners. A good understanding between the national and State authorities has been maintained, and but few complaints have been made. Although the United States authorities have not had the success they expected in removing the disease, it is now dealt with without undue annoyance to our citizens or expense to the State, and the amount of disease on the average has not been greater than under State law. This circular and the various reports of this Board, as contained in the State Board of Agriculture, should be familiar to our farmers. By the information

here given they should be on the alert to prevent the arrival of the disease in their herds, to isolate and deal with any suspected cases, and should be prompt in notifying this Board, or the United States Bureau of Animal Industry, Jersey City, of any suspected cases. Local Boards of Health should also take notice of this and other communicable diseases of animals.

TUBERCULOSIS IN CATTLE.

This is a disease which is recognized as common and as of a very serious character. Its prevalence depends so much on local conditions that it is difficult to state the proportion. It has been found to vary from one to twenty per cent., accordingly as cattle are kept in good pastures and properly housed, or as they are crammed in city dairies and subjected to all the ills of insanitary conditions. It is not found among cattle on ranches.

“It is characterized by the deposition of tubercular matter in serous membranes, in the lungs and other organs, wasting of the tissues and other signs of imperfect or malnutrition, which lead more or less rapidly to a fatal termination; the tubercular matter undergoing various characteristic changes, according to the length of time it has been deposited, and modifying the symptoms accordingly.” (Fleming.)

Prof. Walley speaks of the serous membranes, such as the pleura and the lining membrane of the abdomen, as showing tubercular lesions oftener than any other structure.

The most usual form seen with us can be thus described: “The tubercle at first is very small, about the size of a pin’s head, then that of a pea and hazel-nut. In the course of time these become converted into small, hard, globular nodules, of the color of connective tissue; gradually, however, they become gray and somewhat translucent in sections, and constitute the so-called gray or fibrous tubercle. These gray miliary nodules may remain discreted and scattered over the surface of the membrane like millet seeds; they may become connected together by delicate bands of new connective fibrous tissue, forming the so-called grapes of England, the angleberries of Scotland; or they may become aggregated together and form immense masses, which may degenerate in particles or *en masse*, or they may remain fibrous.

The “grape” or “angleberry” appearance is, perhaps, better

described by the German name of *perlsucht*, or pearl disease. This post-mortem appearance, so often seen, is very diagnostic.

Besides the serous membranes, tuberculosis of the lungs, tubercular infiltration of the lymphatic and mesenteric glands, tubercle in the liver and in the alimentary tract are not rare. Fortunately, tuberculosis of the mammary gland or udder is not so frequent as of other glands.

Where there is tubercular deposit in the digestive tract the *fæces* are not infrequently tinged with blood. Ulcers are found here and there. Prior to irruption of the ulcer, in chronic cases, the mucous membrane is elevated by the tuberculous nodule, which is readily distinguished by its yellow color. These nodules are found in various parts of the intestinal tract.

Tuberculosis of the lungs, when occurring in animals, has not a few of the symptoms which characterize the same disease in man. In these cases, cough is a more prominent symptom, and the diagnosis from pleuro-pneumonia, especially in the chronic stages, is not always easy.

In whatever form tuberculosis attacks cattle, the animal does not thrive. With some, the symptoms are loss of appetite, scouring, and mucous or dysenteric discharges and other symptoms of imperfect digestion. With others, the cough and uneven respiration indicate the affection of the respiratory organs. Where the lymphatic or mesenteric glands are involved, the animal will not take on flesh, and remains long in an unhealthy state. Where the mammary gland is attacked, the diseased part, when cut, is apt to have a reddish hue, and the secreted milk is liable to be contaminated with the tuberculous products. In most cases the milk deteriorates in quality, if it does not diminish in quantity.

When we come to examine into the causes of tuberculosis among cattle, they are found to be very similar to those detected as to man. That it is hereditary, the discovery of the disease in calves, and its tracing in the offspring of unhealthy cattle, abundantly prove.

High breeding, and especially in-and-in breeding, seems to favor the development of the disease. Animals ill fed, or kept in large numbers in poorly-aired apartments, are most likely to show the disease. The fastening and prolonged keeping of cattle in rows so as constantly to receive each other's breath is most undesirable.

Cows which are abundant milkers, or which are forced in order to

secure large returns, are most apt to fall victims to the malady. There is also much probability that an animal seriously affected with tuberculous disease will impart it to other susceptible animals near by. Cases enough are on record to show such transfers, and that a particular stable, or part of a stable, where cases have occurred, seems unhealthy for other animals until full disinfection has been practiced. It may not be so actively communicable as to deserve to be called contagious, as many claim that the cases in which it is communicated are exceptional. They are chiefly, if not entirely, those in which the lungs are so diseased as that the breath is full of infective particles; those in which the discharges from the bowels, as dropped upon the grass, come in contact with grazing animals, or those in which a diseased udder conveys the malady to calves.

Prof. Walley, of Edinburgh, is so pronounced in his views as to say that a tuberculous animal is "useless for breeding, dangerous for dairy purposes, valueless and dangerous as a companion, and its flesh noxious for human food," and so claims that our whole energy should be directed not to curing an animal, but to preventing the disease.

Prof. Williams, speaking of those cases in which the tubercular deposits have become masses, says that they are to be viewed as excrescences, and if they are carefully removed, and the membranes and structures in which they are imbedded, and from which they grow, are carefully dissected from them, the flesh is perfectly good. Others insist that all such flesh shall only be used after thorough cooking. The question as to the use of the milk has been made to depend much upon the condition of the udder, and upon the presence or absence of tuberculous deposit in it. This is often hard to determine until after death. It is also difficult to see how, in a cow greatly affected in the alimentary canal or in the lungs by a constitutional disease, such a secretion can remain pure. It is now believed by many physicians that the uncooked milk from tuberculous cows is a frequent cause of tuberculosis, and especially of mesenteric tuberculosis, in children.

For the prevention of tuberculous disease in animals the following good rules are given :

1. All flesh and offal of affected animals, especially in the advanced stages of the disease, should be destroyed.
2. All suspected animals should be carefully isolated until pathognomonic signs or tests have become developed.

3. All actually affected animals should be slaughtered.
4. All contaminated food, litter, &c., should be disinfected or burned.
5. All infected cow-houses should be disinfected.
6. No animal whose history is tainted, even in the slightest degree, or in whose system there exists the least suspicion of tubercle, should be used for breeding purposes.
7. Great care should be exercised at the period of birth to avoid any influences which will weaken the tissues in adulthood.
8. Breeding animals should be carefully shielded—as far as is practicable—against debilitating influences of any kind.
9. The system of feeding and general management of our high-class stocks should be regulated on a more rational and conservative basis than that on which it at present rests.
10. City dairies should be prohibited, and the inspection of dairies should be a part of the duty of Health Boards.

The treatment of an animal suspected of tuberculosis and yet not so affected as to be of no value, should aim at fattening. If the muscular tissues are to all appearances healthy, as tubercle is never as a rule developed in such tissue, it is not to be rejected as food simply on the fact that masses are found in the abdominal cavity, or that the lungs or glands are diseased. There seems to be stronger evidence that the uncooked milk of animals suspected of tuberculosis should not be used. Yet if there is no tubercle in the udder, there are those who still claim that the milk is not to be condemned.

The fact that tuberculosis in cattle is admitted to be largely on the increase in Europe, in Great Britain and in this country, and that it is an outcome of forced and unsanitary methods, and is especially prevalent among high-bred and pampered stock, should lead all stock-raisers to a closer watchfulness over the laws of health which pertain to cattle, not less than to human kind. Pure air, pure water, cleanliness of skin, good bedding, proper food and exercise, and special attention to milch cows, is essential to the preservation of the health of herds.

BOVINE AND HUMAN TUBERCULOSIS AS RELATED.

For a long time there have been those who have asserted a relationship between bovine and human tuberculosis and the possibility of the former being transmitted to mankind.

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Klencke was probably the first to claim communicability by means of the milk of scrofulous cows.

"Villemin, of the Val de Grâce Hospital, Paris, in 1865, and again in 1866, led the way in experimental investigation. Soon afterwards Gerlach, then principal of the Hanover Veterinary School, undertook a series of experiments, which were conclusive as to the communicability of the disease to various species of animals. At the same time (1868), Chauveau, then at the Lyons Veterinary School, instituted experiments which had the same results as those of Gerlach, and proved beyond doubt that the disorder could be conveyed not only by inoculation, but also through the digestive apparatus. Chauveau was, I believe, the first to indicate the danger of allowing the flesh of tuberculous cattle to be utilized as human food. The veterinarians, Harms, Günther, Bollinger, Bagge, Zürn, Semmer, St. Cyr, Jolin, Leisering, and others, experimenting in the same direction, all reached the same conclusions, and, with Toussaint, of the Toulouse Veterinary School, showed that flesh and milk were infective."

The more recent testimonies of Professor Crookshank, Dr. Fleming, Professor Koch, and many others, is in the same direction.

Since the discovery of the bacillus tuberculosis in man a bacillus found in animals is generally admitted to be allied or identical. Professor Crookshank says, "I regard the tubercle bacillus in the cow as identical with that found in man." Such was the view of the congress on tuberculosis in Paris in 1888, and a similar one held in 1891.

The chief differences of opinion are as to how far and by what means the disease is transmissible to mankind. The differences of opinion may be specified as follows :

The first, which is very small, claims it cannot be communicated.

The second claims it is only communicated through milk when tuberculous disease is found in the udder.

The third claims that, if tubercle exists in any part of the animal, the milk is unfit for use.

The fourth claims that, if the tuberculous deposit is found in a part, that part is unfit for human food and should be rejected.

The fifth claims that not only should the part itself be rejected, but the whole carcass, since tuberculosis is generally a constitutional disease and as such may affect the whole body, although no bacilli have been discovered in the muscles. The best-sustained view is the second, viz., that milk should not be used when the disease is in the udder. However, the view that the milk of all cows that have tuber-

cular lesions in any part of the system should be rejected, is rapidly gaining ground.

At the International Congress of Hygiene (London, August, 1891), in the section on animal disease, there was important discussion as to tuberculous disease in cattle by English and Continental authorities. All were agreed that the milk-supply needed careful guarding by some general means of inspection. There was much difference of view as to the need of governmental inspection of meat, as it was claimed that the disease very rarely showed itself in muscle and danger was overcome by boiling.

WHAT IS THE DUTY OF THE STATE AS TO IT?

It must be admitted that it is very difficult to deal with tuberculosis. No test of milk will show its unfitness, and the same is generally true of meat or muscle. It does not as yet seem feasible to say that no meat shall come to market which has not been examined by a competent inspector. The only two things that seem to us feasible, are the inspection of dairies and power on the part of some authorities to condemn diseased animals or diseased carcasses. In all such laws it is easy to theorize and to prove what ought to be done. But all sumptuary laws have to do with what is possible and what is expedient. At present we see only one thing to do, and that is to compel inspection of all city dairies, and to give power of destruction or condemnation of all tubercular animals or tuberculous carcasses. It is agreed on all hands that the disease is chiefly spread and propagated in dairies that are kept within the confines of cities. The cattle in such are stall-fed, have lack of air, sunshine and pasture, are pressed with grains and artificial feeds of various kinds, and are often amid surroundings most unfavorable to health. The safety of both the meat and milk-supply requires a system of inspection by veterinarians who can detect disease, and who need authority to condemn animals unfit for flesh or milk-supply. Such dairies are, in fact, in unfair competition with the farmer. But the interest of health especially requires this guard. We urge upon the Board of Agriculture the preparation of a law which shall meet this need, and that it urge its passage. Also, whenever any owner or Local Board of Health has reason to suspect tuberculosis in a herd, a veterinary surgeon should be sent for, and the case decided. If unable to decide, the State authorities should

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then furnish aid in determining the case, and there should be with one or both authority for destruction. All large cities should be encouraged to appoint meat inspectors, and where there are abattoirs, there should be systematic inspection of meat. The questions whether there should be payment made for animals destroyed will be discussed as to this and other diseases together.

ACTINOMYCOSIS.

This disease has had various names, such as lump jaw, swell head, wooden tongue, sarcoma, cancer, tuberculosis, &c. While growths of this kind had long been known on the continent, as occurring rather strangely among cattle, it was not until 1877 that their origin was known. In that year Bollinger, of the School of Veterinary Medicine, in Munich, Bavaria, found in these tumors bunches of a microscopic plant of a radiating form, and so gave it a Greek name, which means "radiating fungus." It is now generally called the "ray fungus." The parts of the plant radiate like the spokes of a wheel. Finding lodgment, as it often does, in a decayed tooth or between the gums, it begins to grow, and sets up an inflammation which results in grizzly tissue, formation of pus, &c.

The disease did not attract formal and public attention in this country until 1883, when Dr. W. T. Belfield, of Chicago, made it the subject of a contribution to the Transactions of the American Public Health Association, meeting at Detroit (Vol. IX.) Fleming gave a description of the disease, and recently it has attracted much attention. The disease has also been discovered very rarely in hogs and in man.

It was the subject of an important paper at the International Congress of Hygiene, at London, 1891, by Professor Crookshank. He showed that its manifestations were not confined to the jaw and tongue, the nasal cavities or larynx, but that it so invaded the lungs as constantly to be mistaken for tuberculosis.

The skin and subcutaneous tissue is a favorite seat of the disease, where it appears as wens, &c. The opinion seemed to be general that it was a parasitic disease, dependent upon a fungus derived from the cereals upon which the animal fed. Many accurate observa-

tions go to prove that in certain districts the pasture is infected with the germs of the parasite.

Although derived from a common source there is no proof of its communicability from animal to animal. It is chiefly of interest because the parasite and the disease alike need investigation, and because of its confusion with tuberculosis.

The papers already referred to, and those of Dr. Paguin, of the Missouri State University, and the annual report (1890) of Dr. Wickerston, Health Officer of Chicago, are valuable as reference. The two latter claim its transmissibility. As its diagnosis and treatment must be left to the veterinarian, we do not further enlarge upon it.

ABORTION.

This sometimes occurs among herds to such an extent as to cause great loss.

(a) An animal aborting from some accidental cause is more apt to abort afterward, although the rule has many exceptions.

(b) Animals have nervous systems and are susceptible to impressions, and some more than others. Young cattle in calf should not be left with cows at their time of calving. Instances are known where calving or abortion in presence of the other cattle has seemed to give rise to a predisposition.

(c) Pregnant animals are sometimes unfavorably affected by certain weeds or foods or by vegetable parasites. Thus it is known that "ergot of rye" freely fed tends to cause abortion, and always where it occurs the quality of foods should be examined.

(d) There is no longer doubt that the uterine secretions, especially of an animal that has aborted, may give rise to a decomposition or may have some form of vegetative parasitic life which will impart the disease to animals that are in the same yard or touch or inhale the particles. It is therefore always best to keep other animals from the stall or yard in which abortion has occurred and to sprinkle the straw, litter, &c., and the woodwork daily for a month with water to which commercial sulphuric acid has been added in the proportion of one pint to eight gallons of water. Others use corrosive sublimate

(poison) one ounce to eight gallons of water or rely on the copperas, lime, or other disinfectants before named. At least, recognize that abortion is probably communicable and that isolation and disinfection help to prevent it in other cattle.

NOTES ON THE SANITARY REQUIREMENTS OF A DAIRY FARM.

THE FARM BUILDINGS IN RELATION TO THE BUSINESS OF MILK PRODUCTION.

"A farm-house may be in all respects wholesome as a residence, and yet be badly planned as regards the business of a dairy farm. All the arrangements of the structure and the habits of life ought to have in view one cardinal principle—the separation so far as possible of the domestic life from the milk, in its production, manipulation, storage and despatch. The reasons of this are two—(1) that milk is prone to contamination from exposure to disease in the persons of those working among it; (2) the risk of contamination by disease is just in proportion to the closeness of the relation between the ordinary domestic life of the farm-house and the structure and arrangements necessary to the business of the dairy. If the bed-rooms, the washing-house, the conveniences, &c., are mixed up with the milk-house, the boiler-house, the cow-sheds, &c., then whenever disease appears in the family or household, mischief is certain to follow. If these various parts are separated, then the chances are that, before the nature of the disease is recognized, no harm will have been done, and after, a few precautions will enable the farmer to carry on his business without interruption.

THE FARM BUILDINGS AS REGARDS THE HEALTH OF THE COWS.

"It seems unnecessary to expend words in proving the statement that only healthy cows can produce wholesome milk. The health of cows depends upon the same general conditions as the health of human beings—fresh, warm air, cleanliness, pure water, proper food. The cow-house, or byre, ought to be well lighted and ventilated, evenly paved, not overcrowded, kept clean by regular removal of filth, and by periodic lime-washing of the walls. The influence of warmth on the flow of milk is so great that in the absence of any source of heat but the bodies of the cattle, the temperature is generally maintained

by preventing the access of fresh air. This has the same effect on stalled cattle as the same practice in the houses of the poor has upon the inmates—it promotes disease of the lungs, especially consumption.

DISEASE IN MAN IN RELATION TO MILK.

“By the Dairies, Cow-sheds and Milk-shops’ Order, of England, it is declared to be unlawful for ‘any person suffering from a dangerous infectious disorder, or having recently been in contact with a person so suffering,’ to milk cows, or otherwise engage in the business of milk production or distribution. ‘Contact’ ought to be regarded as meaning any sort of communication, direct or indirect, with infectious disease; *e. g.* it would be obviously dangerous for any one who had been in the sick-room, or who had washed an infected washing, to proceed at once to milk cows, &c.

“The only safe rule for a farmer to follow is to let no one who is not in perfect health handle his milk. Infectious diseases taper off into slight forms, only recognizable when associated with well-marked cases. Scarlet fever, especially in adults, may produce merely a sore throat, or a blush on the skin, which may never be observed. Enteric fever may lurk in what seems to be a simple diarrhoea or ‘weed.’ It is not only ill-health which has continued for some time, but also the sudden indisposition which overtakes a previously robust and healthy person which has to be suspected.

DISEASES IN THE COW IN RELATION TO MILK.

“By the Dairies, Cow-sheds and Milk-shops’ Order the milk of a diseased cow is forbidden to be mixed with other milk, or sold or used for human food, or given to other animals, unless and until it has been boiled. But this enactment refers only to cattle plague, pleuro-pneumonia and foot and mouth disease. These are acute diseases, which soon stop the flow of milk. Tuberculosis is a more insidious disease, which does not do so until it enters on the last stages. Yet the milk is unquestionably unwholesome, and may convey tubercle (the cause of ‘consumption’) to man. Therefore any animal having rapid breathing, a short cough, or emaciation, should be examined by a veterinary surgeon; and the milk of no animal showing signs either of local or constitutional disease should be given to man.

“A grave suspicion has recently arisen in the minds both of medical men and veterinary surgeons that certain eruptive diseases affecting the teats and udder of the cow are associated with the propagation of scarlet fever among the consumers of the milk. It is not necessary to accept this as more than possible to justify the advice that careful

inspection of the cattle as to the existence of any affection of the teats and udder is demanded, and *careful exclusion of the milk of any animal so affected from human consumption is absolutely necessary.* The teats are liable to different kinds of injury or disease. They may in cold weather be chapped or hacked just as the hands of men and women are chapped or hacked by the influence of cold air upon them, especially when wet. This leads to occasional bleeding in the act of milking, and although no actual influence on health may follow the use of such milk, it is disagreeable to think of using it. But there are also eruptions, probably of different distinct kinds, of the nature of vesicles or pustules, which, through the friction of milking, are broken and give rise to scabs and ulcers. These are well known to be infectious from cow to cow through the milker. Whether or not it be the case that one or other of these eruptive diseases in the cow may produce scarlet fever in man, it certainly is not pleasant to think of the consumption of milk contaminated with blood and matter, and therefore, for this reason alone, the milk of cows so diseased should not be distributed with the general produce of the dairy. It is a question of sacrificing the milk of one cow or of running the risk of poisoning the milk of a whole dairy.

CLEANLINESS IN GENERAL IN RELATION TO MILK.

"As a rule, nothing could be desired more than is generally practiced by the farmer, or rather by his wife, as regards the careful scalding and cleaning of milk vessels. It is impossible to be too scrupulously careful in this respect. Some form of tin vessel, to all the internal surface of which the hand can reach, and which is open to inspection, should be used to hold or convey milk.

"A little advice, also, as to the cleanliness of the udder and teats of the cows, and of the hands of the milkers, is not unnecessary. Attention to the bedding of the cow and the removal of droppings from the place where the animal lies will prevent the soiling of the udder. If soiled, the teats ought to be washed before milking. As to the hands, no instrument requires such careful washing as the human hand, considering the variety of offices to which it is applied before it is engaged in the work of the dairy. Every drop of milk may be said to have passed through the hands of a milker, and before milking every milker's hands ought to have been carefully washed. Convenience for the comfortable and efficient use of soap and warm water is an indispensable requisite of every dairy.

"The milk-house ought always to have its door opening into the free air. It ought to have no other apartment above it. It ought to be well ventilated, have no internal communication with drains, be entirely free from damp, and so placed that the air which reaches it shall be pure, nor near the dung-pit. It will be observed that the

usual practice of having the milk-house incorporated with the dwelling-house, opening off the lobby, or kitchen, or scullery, is condemned.

"Dairy farmers and dealers in milk, however skeptical as to the argument in favor of these precautions on the ground of the likelihood of disease being conveyed by milk, ought not to forget the commercial aspect of failure to be careful and cleanly in every detail of their business. In the first place, if by any chance even suspicion arises in the public mind as to the milk of any farmer or dairyman, his business is for the time ruined. Naturally the first effort at self-protection is to change the source of milk-supply. But apart from this, the milk which is produced from the healthiest cow, in the cleanest byre, handled by the cleanest milkers, collected in the cleanest vessels, and stored in the cleanest milk-house, keeps the longest. In hot weather this means money. A thoughtful customer at once infers, and is right in inferring, that if one man's milk keeps longer than another man's it is to be preferred. It is not merely because of the loss implied by the 'turning' of the milk, but because it is some want of cleanliness which causes the 'turning.'"

ANTHRAX, OR SPLENIC FEVER.

The seriousness of this disease is shown by its ravages in some European countries, and especially in Russia. Professor Tyndall informs us that in the single district of Novgorod, in Russia, between the years 1867 and 1870, over 56,000 cases of death by splenic fever among horses, cows and sheep were recorded. Nor did its ravages confine themselves to the animal world, for during the time, and in the district referred to, 528 human beings perished in the agonies of the same disease. The causes and cure of the malady are well summed up by Professor Law, in an article in the second report and papers of the American Public Health Association, page 467 :

"The most universally acknowledged cause of the malady in animals are plethora, or a state of blood highly charged with organic elements, an impervious soil or subsoil for pasturage, a very rich surface soil, inundations, a period of heat and dryness, calculated to foster decomposition of organic matters to a great depth in the ground, and a great contrast between the night and day temperatures.
* * * While this affection is communicable to animals, by inocu-

lation, it can scarcely be said to spread in any other way, and is, therefore, to be looked upon as essentially an enzootic disease. We must go to such places as the inundated margins and deltas of large rivers, dried-up lakes and marshes, or the rich and pestilential Russian steppes, to find any approximation to the disastrous outbreaks in man and beast which blacken the history of past ages."

What was done in the cases reported by Professor Law to check the disorder remains to be noted. One hundred of the best steers were turned on a higher pasture with a gravelly subsoil. The remainder were, of necessity, left in the higher of the two meadows formerly occupied, but were fenced out from the swamps and low meadows where the clay approached near to the surface. Antiseptic methods of treatment were used, and most of the cattle recovered. In cases occurring in Salem county the bacillus anthracis was detected. Other cases have occurred there since.

TEXAS, OR SOUTHERN, CATTLE FEVER.

This is generally regarded as allied to anthrax, or splenic fever. Its classification cannot be said to be settled. It is not believed that it has the same law of contagion as the malignant anthrax of Europe, or as similar outbreaks which occasionally occur in this country.

This disease, although communicable, is not regarded as contagious in the general sense. D. E. Salmon, D.V.M., a veterinarian of the National Agricultural Department, says: "The real danger exists in the pastures or other grounds over which Southern cattle, whether sick or well, have traveled."

If other cattle are turned in the same pastures, or go along the same roads, they are liable to contract the disease. The sick animal does not, because of his sickness, impart the disease, but the apparently-well Southern cattle seem to carry the contagion of the disease, and will impart it to the pastures in which they feed or the roads on which they travel, although, even afterward, not showing it in themselves. It is even claimed that a sick Southern animal does not infect the pastures, while those from the South which have sickened by pasturage or by driving on fields or roads infected by apparently-well

Southern cattle do infect them. This would suggest the idea that it is only at a certain stage that the infective particle is transmissible. Also, it is believed that Northern cattle which have contracted it through road-driving, or pasture will not impart it to other cattle, either directly or by means of pastures. We cannot yet regard the history of this contagion as definitely settled. Several outbreaks, confined to Texas cattle brought into this State, have been reported to us. No extension of the disease has occurred. It is therefore important to state what is to be done in such cases, both so as to exercise due precaution and to avoid unnecessary alarm.

The sick Southern cattle should be "quarantined upon the infected pasture," where they cannot come within one hundred feet of other animals. They should be securely fenced upon the infected pasture until after a killing frost. Such as die should be buried beyond the reach of dogs. The question of slaughter must be left to local authorities, but by most this is not considered necessary in order to check the extension of the disease. Until more settled views are entertained, we recommend the same course in case of native cattle which may have contracted the disease. It is not necessary to quarantine all the cattle, but only those sick and the fields in which they are. Purchasers of Southern cattle should not allow other cattle, until after severe frosts, to be upon or go over the same ground on which they are left. It might become necessary for a township to prohibit the bringing in of any cattle from districts infected with Texas fever. The danger is the more insidious from the fact that the ground over which they pass or the excretions they leave upon it impart the disease. The "ticks" which are found upon the cattle help in determining whence they came, and now are claimed to have some relation to the disease. Southern cattle without ticks cannot infect a pasture. Ticks alone scattered on a pasture will produce the disease. Whether the disease can be transmitted by any other agency must be decided by future investigations.

There is no specific treatment known for the disease. The usual course of veterinarians is to give oils or mucilaginous drinks and niter, or some other form of diuretic, to relieve the dryness of the fourth stomach and the congested state of the alimentary tract, the congestion of the liver or spleen and the bloody urine. Where there seems to be much pain, opium is freely administered. Many recover, but the relation of treatment to their recovery is not always known.

The meat of any animal affected with the disease is not fit for use. It shows putrefactive changes so marked as not even to be classed with the meat of some of the more diffusive contagions.

HUSK, OR HOOSE, IN CATTLE.

Among the various forms of parasites that infest the lower animals are those belonging to the nematoda (round worms). Some of them are common to men and animals. Others are not in any of their forms of life transferable from the one to the other.

Cobbold says the nematodes of the ruminants (cud-chewing animals) are both numerous in and destructive to their bearers, those infesting the lungs being productive of a parasitic bronchitis, termed husk, or hoose. In cattle, the lung-worm (*Strongylus micruris*) is particularly fatal to calves, while *Strongylus filaria* attacks sheep and especially lambs. A larger but less common lung strongyle (*S. rufuscens*) is sometimes found associated with the latter. In 1875 I conducted experiments with the view of finding the intermediate hosts of *Strongylus micruris*, and I arrived at the conclusion that the larvæ of this parasite are passively transferred to the digestive organs of earth-worms. The growth and metamorphoses which I witnessed in strongloid larvæ taken from earth-worms (into which I had previously introduced embryos) were remarkably rapid.

The *Strongylus micruris* is quite similar to the *Strongylus filaria* the parasite found in the lungs of lambs and sheep. To the affection as found both in lambs and in calves the names husk, or hoose, phthisis pulmonalis verminalis, and parasitic bronchitis are given. It is better, however, since the worm itself is somewhat different, to give different names. Neither should be called phthisis pulmonalis verminalis, since phthisis has come to be so exclusively applied to consumption or wasting due to tuberculous deposit. The name "parasitic bronchitis" is the best, if a general term applicable to all animals thus affected is used.

The bronchial cough of the calf makes the name husk, or hoose, quite distinctive for it. The parasite *Strongylus micruris* gains access to the pulmonary tissue and bronchial tubes through the circulation,

the ova being absorbed from the digestive canal. The seat of the irritation is indicated by a bronchial cough, husk, or hoarse, loss of flesh, a varying degree of constitutional disturbance, and death by suffocation, if the sufferer is not relieved. If any mucus be coughed up and examined the parasites may be discovered. Bronchial irritation occurring in calves during summer or autumn should always be looked upon with suspicion, and its source thoroughly inquired into. The disease is rarely found in cows and oxen, although cases of it do occur in these. It is said to be most frequent where calves are exposed to dews, and pastured on wet pasture, or low, ill-drained lands, or where, in dry summers and scarcity of water, they are supplied by stagnant pools which eventually become dry. It is most common in the late summer and fall. Most of the veterinarians of the Board have had occasion to distinguish between it and pleuro-pneumonia, as it is often confounded therewith.

The treatment recommended is as follows :

The calves are to be warmly housed if the nights be cold ; the affected animals are, upon all occasions, to be removed from the healthy—not that the disease is contagious in itself, but that the parasites or their ova are apt to gain access in the bodies of the healthy ; and for the same reason the healthy should be removed to fresh pasture and to dry situations, as the fields upon which the disease has prevailed will, for a time at least, be tainted by the parasites and ova.

In treatment, chief reliance is placed on the inhalation of fumes either of sulphur or chlorine, as both sulphurous acid and chlorine gas will kill the parasite. The mode of using these is the same as in the disinfection of dwellings, and the details can be given by any competent veterinarian.

Generally, three or four inhalations of fifteen minutes each day will much limit the disease, and finally cause it to disappear. Salt, turpentine, lime-water, &c., have been found useful.

The inclosures in which the animals have been temporarily housed should be thoroughly scoured with boiling-hot water impregnated with salt.

The free use of commercial sulphuric acid, one pint to eight gallons of water, sprinkled over the yard, and thorough whitewashing, add to the security against the recurrence of the disease.

COMMON COMMUNICABLE DISEASES OF SHEEP.

SHEEP-POX (*VARIOLA OVINA*).

It is propagated solely by contagion, and probably never arises here spontaneously. Loss of appetite, often trembling, general soreness, high fever, and the eruption of little red nodules, which, in from twelve to twenty-four hours, are conical pustules, generally easily mark the disease. The duration is about six days. It is very transmissible, as forage, pens, the wool and secretions convey it. Winds may convey it a considerable distance, according to concentration and virulence. Extensive sanitary police measures sometimes need to be instituted. Inoculation has often been resorted to with success. The sick should at once be separated from the rest. A second division of those doubtful is often advisable. All those that have it and recover should be quarantined for a time. The thorough washing of the sheep, after full recovery, is desirable. Butchers should not expose themselves to such flocks, or should use special cleansing afterward, so as not to carry the disease to other folds.

CONTAGIOUS FOOT ROT, OR HOOF ROT, OR FOOT HAIT.

It is a disease which, as the name indicates, manifests itself in the foot or hoof. Some regard it as a local inflammation, or it may be caused by some fungous or other germ. The painful step, the red skin between the clefts of the hoof, the pimples, pustules or vesicles, and the foul, viscid discharge reveal the disease. The animal becomes feverish and sick, and its condition varies with the progress or relief of the disease. The appearance of the foot, the fact that only one claw or foot is affected, and the gradual spread of the malady among the flock, distinguish the disease from ordinary foot-soreness.

The preventive and sanitary measures are nearly the same as those already detailed. Separation of the diseased and careful disinfection of premises must be used. The sheep-pens should be vacated and cleansed after recovery. The well sheep had better be removed for a time from the rest, and made to pass through a trough containing in the proportion of a pound of chloride of lime to a pail, or two and a half gallons of water. Or the disinfectant solution already named of

iron and carbolic acid will answer. The feet of those diseased should be often well cleansed in water, or powdered sulphate of copper (blue vitriol) applied, either in very fine dust or in a solution of a half ounce to a pint or mixed with tar, as may be directed.

SCABIES, OR SCABS.

This disease is owing to a parasitic insect (*acarus*), and is spread by its propagation and migration. The insect causes great itching, and so the fleece ere long becomes ragged. The shepherd soon perceives an uneasiness dependent upon skin irritation. The remedies are those which will kill the insect and do not hurt the sheep. Their name is legion, and much depends on the mode of application. The preparation of Zundel, which consists, by weight, of quicklime, one part; impure carbolic acid, one and a half parts; carbonate of soda, three parts; and soft soap, three parts, made into a stiff paste, is an example. For after-cleansing and disinfection of animals, buildings, manure and forage, directions already given suffice.

The forms of scabies, or itch, caused by an insect and known as *mange* in horses, cattle, pigs and poultry, is of much the same general character, although not so communicable as that in sheep.

COMMON CONTAGIONS OF SWINE.

INFECTIOUS PNEUMO-ENTERITIS—SWINE PLAGUE.

There is some difference of opinion as to the earliest appearance of this disease. Diseases of swine until recently were less fully classified than those of most other farm animals, and so under the names of "Anthracoid Erysipelas," "The Distemper," "Hog Cholera," "Blue Sickness," Typhoid Fever, &c., ailments really different have been associated. At one time it was regarded as caused by a worm, the *Stephanurus dentatus* (see Cobbold, Fleming, White, Fletcher), which was not unfrequently found, but is now known to have no causal relation.

Nusken, in his General Pathology of Veterinary Science (Munster

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and Ham, 1829), and Spinola in his treatise on "The Diseases of the Pig," Berlin, 1842, describe symptoms which many identify as the same disease.

Dr. G. Sutton, of Aurora, Indiana, described this disease in 1858 under the head of "Swine Pestilence" in the "North American Medico-Chirurgical Review." In the United States Agricultural Report of 1861, Dr. E. M. Snow, of Providence, Rhode Island, gives a detailed account of the disease, and states that it was recognized in this country in Indiana in the summer of 1856.

Harms (Hanover, 1869), under the name of pig erysipelas and pig plague (pamphlet), is believed to describe this disease.

Dr. Budd, in a lecture to the members of the Royal Agricultural Society in 1865, and in his treatise on typhoid fever, speaks of it as the exact counterpart of typhoid fever in man, as does Prof. Wartley Axe, of London, in "The Veterinarian," July, 1865. They were both mistaken, as shown by Dr. Murchison and others. Roell (Wien., 1876) follows nearly the views of Harms. If, as is probable, the disease is included in the one so often described as anthracoid erysipelas, according to Fleming (1875), it prevails as a "most fatal and destructive malady in Great Britain, on the Continent, and in America and Australia." In the United States Agricultural Report of 1878, Prof. James Law accurately defines the special symptoms and gives details of autopsies made by him in Scotland. He has also since made important culture and other experiments as to it. The Medical Officer of Health of Great Britain, in an introductory note to the report of Dr. E. Klein, V.R.S. (1877), says of the swine plague and hog cholera that "the disease is rife in all parts of England and Ireland, and it produces oftentimes great ravages among herds."

Zundel (Paris, 1874) probably describes the same disease, as does Bollinger in Ziemssen's "Cyclopædia of Practical Medicine," London, 1875, where he says of swine, "They are subjected to a scourge which is frequently, though falsely, reckoned as anthrax, and is indeed similar to it in many features and equally dangerous, viz., the hog plague."

Dr. J. M. Partridge, in the second annual report of the Indiana State Board of Health (1884), says:

"Swine plague, or hog cholera, undoubtedly appeared in this country as early as 1860. It was not then regarded as a contagious disease, and received no general attention or public notice until fifteen years later, or about 1875. At this time its widespread proportions

and fatally-destructive character began to cause great consternation throughout the pork-producing regions of the Northwest, as it was estimated that the loss to the producers from this disease amounted to the enormous sum of \$15,000,000 annually. In this emergency Congress appropriated \$10,000, to be placed in the hands of the Commissioner of Agriculture, for the purpose of investigating diseases of domesticated animals. The Commissioner, finding that the loss of swine was greater in numbers and value than that of all other animals combined, wisely determined to expend the greater part of this appropriation for investigations in this direction. He therefore appointed an examiner in each of the seven States where this disease was most prevalent. Their examinations and reports have done great credit to the authors, and rendered most valuable service to the country."

For one of the earliest and the most thorough inquiries into the disease, we are indebted to Dr. E. Klein, F.R.S., whose valuable research and reports on its history, pathology, &c., are to be found in the public health reports of the Medical Officer of England, for the years 1876 and 1877. These have been followed up by the valuable series of investigations by Detmers, Law, Salmon and various others under the auspices of the United States Agricultural Department.

Because of the great mass of investigation and literature to be found on the subject, of which those referred to are but specimens, this Board, under the present provisions of our law, did not regard it as essential to do more as to pathological investigation of the disease, than to make enough post-mortem examinations to confirm its diagnosis. As there had been sporadic cases of it in the State before, it was carefully noticed in the first circular of this Board as to contagious diseases of animals, issued in 1879 (see Fourth Report), and has frequently been noted since.

It is not necessary here to enumerate all the various symptoms or pathological changes which are found in various cases, but only such as are the most constant and diagnostic. Only the condition of the lungs, the intestines, especially the large intestine, and the lymphatic glands, are constant as to post-mortem appearances. In addition the changes in the skin, in serous membranes, in the heart, the liver, the spleen and the kidney, are worthy of note.

The disease is not transmissible to men, but is, although not readily, to some of the lower animals, as the rabbit, the mouse and the sheep.

The following is mostly Klein's description of a typical case :

"*In the severer cases* we observe constitutional and other disturbances in the living animal after an incubation period of two to five or more days. The animals do not feed well, are dull, creep into their straw, probably from a sense of feeling cold. Their skin feels hot and the body temperature is raised. This last symptom shows, however, great irregularity and variation. In some of the severer forms we find the skin of the groins, neck, inside of the thigh and perineum swollen and of a patchy or diffused redness. This redness may be absent altogether, or it may be only transitory; it may appear only for a short period at the outset, or near the fatal termination of the disease. Hæmorrhages in the red patches are occasionally seen; they lead to the formation of scabs. The red patches of the skin, at all events, are a very inconstant symptom.

"In many severe cases the animals suffer from diarrhœa. This may be persistent or only temporary, disappearing and coming on again. When it is of a permanent character, the animals become soon emaciated to a considerable extent.

"The respiration is quick and impeded. There is often hoarseness and cough.

"On post-mortem examination we find that ulceration of the ileo-cæcal valve, and especially of the colon, is very marked. In the latter we may find confluent ulcerations of great dimensions, occasionally, several inches in diameter. As a rule they are round or oblong. The Peyer's glands near the ileo-cæcal valve are distinct. In the lower part of the colon we find the solitary lymph-follicles very marked, projecting more or less over the surface of the mucous membrane as nodular swellings. The mucous membrane of the large intestine and duodenum (in some cases also that of other parts of the small intestine) presents numerous small hæmorrhages. The submucous tissue of the large intestine—especially the colon—is the seat of hæmorrhages.

"The lymphatic glands of the pelvis, the mesenteric glands and the glands in the porta hepatis are greatly enlarged and firm; in their interior may be seen fibrinous deposits; their peripheral parts are more or less filled with effused blood.

"The spleen is occasionally enlarged, its capsule shows numerous small hæmorrhagic spots. In one case I have seen considerable number of white, brittle, nodular or irregularly-shaped masses in the substance and underneath the capsule of the enlarged spleen. The liver is occasionally enlarged, full of blood; in some cases it shows hæmorrhagic spots underneath the capsule.

"The peritoneum is highly inflamed, containing numerous hæmorrhagic spots; there is considerable amount of clear or more or less blood-tinged and coagulable exudation in the serous cavity. Masses of solid lymph are found on the omentum, the mesentery and the serous covering of the large intestine, which in some cases show also numerous minute false membranes. The pleura and pericardium are

in most cases more or less inflamed, their cavities containing inflammatory exudation.

"The lung is the seat of more or less severe lobular pneumonia; considerable portions of both lungs become airless and more or less consolidated. The trachea and bronchi contain muco-purulent matter slightly tinged with blood.

"The tongue, mucous membrane of mouth and epiglottis occasionally show hæmorrhagic patches or even ulcerations.

"The disease is highly infectious. By direct experiment it can be proved that the diseased lung, the contents of trachea and bronchi, the diseased intestine—particles of ulcerated mucous membrane that are discharged with the fæces—the diseased spleen and the peritoneal exudation contain the *materies morbi*. The disease can be produced in a healthy animal by inoculating a minute quantity of the *materies morbi* into the skin or mucous membrane. The disease may be induced also by mixing the *materies morbi* with the food. I have not been able to determine, definitely, whether the fresh blood of diseased animals when inoculated does or does not, as a rule, induce the malady. The disease can be produced by simple cohabitation with a diseased animal, or by putting a healthy animal in a place where a diseased one had been previously kept."

The eruption is not always present, and yet most look upon it as an eruptive or exanthematous disease. In severe cases it is rarely absent. There is a "uniform or patchy redness on the under part of the abdomen and on the inside of the fore legs and thighs. The eruption is in the form of small, round, raised spots of a papular appearance, but the minute pimples sometimes fill with a thin fluid, and so become vascular and dry away into crusts." According to Professor Axe the pimples are often successive to a third or fourth crop.

The disease, when caused by inoculation, develops in from three to five days, but its period of incubation, when caught, is not very accurately known, being given as from five to fifteen days. It is communicable by contact, through the air and by articles or persons that have been in contact with the pens, &c.

The external symptoms are a dullness of the eyes, the lids of which are kept nearer closed than in health, with an accumulation of secretion in the corners. There is hanging of the head, with lopped ears, and an inclination to hide in the litter and to lie on the belly and keep quiet. As the disease advances, the animal manifests more or less thirst, some cough, and a pink blush or rose-colored spots and papular eruption appear on the skin, particularly on the belly, inside

of the thighs and fore legs, and about the ears. There is accelerated respiration and circulation, increased action of the flanks in breathing, tucked-up abdomen, arched back, swelling of the vulva in the female as in heat; occasionally, also, of the sheath of the male, loss of appetite and tenderness of the abdomen, sometimes persistent diarrhœa, but generally obstinate constipation. In some cases large abraded spots are observed at the projecting points of the body, caused by separation and loss of the epidermis. In such cases a slight blow or friction on the skin is sufficient to produce such abrasions. In many cases the eruption, blush and spots are entirely absent; petechia are formed in only about one-third of the cases. In some cases there is considerable inflammation of and discharge from the eyes. Some animals emit a very offensive odor even before death. In large herds, where the disease prevails extensively, this offensive effluvia can be detected for a great distance to the windward. In nearly all cases there is a weakness or partial paralysis of the posterior extremities, and occasionally this paralysis is so complete in the first stages of the disease as to prevent walking or standing.

As symptoms of special diagnostic value, which are scarcely ever absent in any case, the following are mentioned: Drooping of the ears and of the head; more or less coughing; dull look of the eyes; staring appearance of the coat of hair; partial or total want of appetite for food; vitiated appetite for excrements; rapid emaciation; great debility; weak and undecided, and frequently staggering, gait; great indifference to surroundings; tendency to lie down in a dark corner, and to hide the nose, and even the whole head, in the bedding; the specific offensive smell, and the peculiar color of the excrements.

If the animals are inclined to be costive, the fæces are generally greyish or brownish black in color, and hard; if diarrhœa is present, it is semi-fluid, of a grayish-green color, and in some cases contains an admixture of blood. About 70 per cent. of the pigs generally die in two weeks. The time of catching is generally from three to ten days.

The disease is not transmissible to man, although some are sickened by its odor. It is transmissible by inoculation and perhaps by contagion to some of the lower animals, as rabbits, mice and sheep, but not readily. Pigs that are kept in a filthy way, that drink polluted water, or are kept in open fields exposed to changes of weather, contract the disease when it is prevalent more readily and severely than

others. It seems especially active when the grass is wet, or when animals by reason of pasturage in stubble or for other reasons have sores or scratches about the snout or body. The infection is exceedingly persistent, and while cold weather and the slaughter of so many hogs in early winter diminishes the disease, the freezing of the virulent matter does not destroy its activity. (Law.)

While no ill results followed experiments as to the use of the salted and well-cooked meat of mild cases, as the amount of fever and the changes which have occurred in cases apparently not severe cannot be fully known, any animal at all sick should not be killed for food.

Although in this country it now seems to be shown by biological examination and post-mortem that there are two diseases, yet the descriptions already given apply to both, and the general rules of prevention and management are the same. Professor Novy, of Ann Arbor, Mich., gives this outline :

“ The fundamental researches of Löffler, Schütz, Lydtin, and Schottelius, in Europe, and of Salmon and Smith, in America, have demonstrated the existence among swine of at least three distinct infectious diseases. These are :

“ 1. Hog erysipelas, or *rouget* of France, and *schweinerothlauf* of Germany.

“ 2. Swine plague, or *schweineseuche*.

“ 3. Hog cholera, or *schweinepest*.

“ The first of these, hog erysipelas, is exclusively a European disease, and has not, so far as known, been observed in this country. In the course of this disease only general symptoms of infection, as in anthrax or septicæmia, are manifested. The most important anatomical changes are as follows : The spleen is markedly swollen and dark-colored ; the mucous membrane of the stomach and intestines is inflamed and infiltrated with blood ; a parenchymatous inflammation of the liver, heart and muscles is present, as well as some reddening of the skin.

“ The second disease, swine plague, appears to be common to both continents. It may be characterized as an inflammation of the lungs and skin, accompanied with death of the lung tissue and slight symptoms of infection. When the disease becomes chronic, a caseous condition of the lungs results, which may excite a similar condition in the lymphatic glands and the joints.

“ The third, hog cholera, is pre-eminently a disease of the digestive tract, and the large intestine is especially involved. It is the great swine disease of this country, and is very probably present in Eng-

land, associated with other forms of disease under the name of swine fever. On the European Continent this disease was unknown until 1887, when it suddenly appeared in France, Sweden and Denmark.

"Apart from this sudden visitation of hog cholera in the above-mentioned countries of Europe, it may be said that on the Continent there are two prevalent diseases—hog erysipelas and swine plague. In this country the former is entirely absent, and appears to be replaced by hog cholera, so that the two swine diseases in America are hog cholera and swine plague.

"A very careful bacteriological study of these three diseases has shown their microbic origin. The researches of Löffler demonstrated the etiological importance of the bacillus of hog erysipelas; those of Schütz accomplished the same with reference to the bacillus of swine plague, and lastly, Salmon and Smith have demonstrated that hog cholera owes its origin to a specific bacillus."

I. No reputable authority claims that much is to be done for the sick swine by way of treatment. The most of these die, and if they recover are so reduced or diseased as not to be worth fattening.

II. This, however, does not at all indicate that nothing is to be done by way of *preventing* the spread of the disease. The following are the chief directions when a case occurs: *Do not remove the sick pig, but remove all the rest.* If the herd is a large one divide it into two or three herds. Let new, temporary pens be made of entirely new boards, with new troughs, new pails, new swill, and to which, or about which no one shall go who has had to do with the old pen. This course carried out *accurately and rigidly* will save most of the hogs in most of the cases. If after removal new cases occur, at once transfer them to the old pen or kill them, and if there are more than one or two cases move the hogs again. After the first case occurs, give to each well hog, of one hundred pounds weight, three times each day a good half teaspoonful of flowers of sulphur dissolved in milk. For those of heavier weight increase the dose in proportion.

Some good authorities claim equally good or better results from the use of ten drops of carbolic acid (full strength) to each one hundred pounds of weight, and given three times per day in solution of a half pint or pint of water.

The only other remedy suggested by a sufficient number of good authorities, is some one of the combinations of sodium with sulphurous acid known as sulphite or bisulphite of soda.

Half-dram doses, three times per day in their usual food, may be

given for each one hundred weight of flesh. We prefer the bisulphite in about teaspoonful doses.

You may choose either of these three named remedies and give them systematically, and see that the pig *really gets* the amount attempted to be given. The treatment should be followed up for at least two weeks.

The same treatment in double quantities for all these remedies is claimed to be of service to sick hogs as well, but full proof cannot be found. In giving such medicines to swine, it is often best to scoop out a part of a cooked potato and then plug it with part of another, and so give it to the animal, as the potato is likely to be eaten, and thus the whole amount given reaches the stomach. The scattering of fine charcoal, of sulphur, of lime, or of plaster on the boards or more cleanly parts of the pen near the trough may also be wise. It is not believed, however, that a pen in which a case has occurred ought to be occupied at all by the well hogs, or by any new herd, until all straw and manure have been entirely removed, all fences whitewashed, and all troughs, and pails, and swill barrels disinfected as directed in former circulars.

As the disease is no doubt often conveyed from the pens or herds of neighbors, or from running water which comes through the premises of those who have the disease, or even through the air from adjacent farms, too great care cannot be taken by any one whose herd has it, that it be not transmitted. Hogs turned out to pasture, especially before or after it is wet with dew or mild rains, seem to get it because the wafted material is more apt to alight and remain amid moisture. There are some remarkable examples of exemptions to herds whose owners have been skilled and consistent and exact in their precautions. Where a neighbor's herd is affected, in the opinion of most authorities it is wise to put adjacent herds on some one of the treatments named, and to use precautions as to the field exposure, as to cleanliness, and even as to change to new pens, so as to anticipate attack.

When hogs die or are killed they should be promptly buried not less than *four feet* under ground, and where other hogs will not have access for two or more years.

No hogs should be allowed to run at large, and if owners are careless, Chap. LIV., Sec. 4, Laws of 1881, provides a remedy.

As the disease is so readily transmissible, swine sent by cars or any public conveyance may so infect these as to impart the disease to other animals.

ON MEASURES TO BE TAKEN IN THE PREVENTION OF
SWINE PLAGUE.

In regard to the general measures to be taken and the rules to be observed in the prevention of hog cholera and swine plague, we refer the reader to the Report of the Secretary of Agriculture for 1888, page 156, or the Report of the Bureau of Animal Industry for 1887-88, page 148, or the Special Report on Hog Cholera, 1889, page 123. The rules and directions there formulated are adapted as well to swine plague, for the bacteria of the latter disease are even more easily destroyed by various agencies than are hog cholera bacilli. In the following pages only the most important points are touched upon.

"The things with which healthy swine should not come in contact are, in the order of their importance, first of all, diseased herds and animals, strange swine, the history of which is not known, offal from establishments using carcasses of swine, recently infected ground, railroads carrying swine, and polluted streams. Soil and water may be infected by living and dead swine or any offal from them.

"When the disease has actually appeared in a herd the question generally arises whether it is worth while to make any attempts to save a portion of the herd or to leave them to their fate. As a rule it may be stated that it is best to slaughter both healthy and diseased at once and give the surroundings sufficient time to rid themselves of the infection before fresh animals are brought into them. If this be not desirable we should recommend the following measures to be rigorously carried out:

"(a) Removal of still healthy animals to uninfected grounds or pens as quickly as possible.

"(b) Destruction of all diseased animals.

"(c) Careful burial or burning of carcasses.

"(d) Repeated thorough disinfection of the infected premises.

"(e) Great cleanliness both as to surroundings and as regards the food.

"If the animals have been removed to uninfected grounds, careful watching is necessary to remove therefrom at once all swine which show signs of disease.

"Among the various disinfectants which can be recommended are the following:

"1. Slaked lime, in the proportion of about 5 per cent. (one-half pound of lime to a gallon of water).

"2. Equal volumes of crude carbolic acid and ordinary sulphuric acid mixed together and added to water in the proportion of two ounces to a gallon of water ($1\frac{1}{2}$ volume per cent.)

"3. Sulphuric acid added to water in the proportion of one ounce to a gallon.

"4. Boiling water.

"5. Corrosive sublimate (mercuric chloride) in the proportion of one dram to a gallon of water (1 to 1,000).

"Solution No. 2 is said to be more active if, while the sulphuric acid is being added to the crude carbolic acid, the vessel containing the latter is placed in cold water, to prevent undue heating of the liquid."

It should be borne in mind that sulphuric acid and corrosive sublimate attack metals, and that the solutions are best made in wooden pails, &c. Corrosive sublimate is also highly poisonous, and the solution should not be made stronger than indicated. The lime is, on the whole, the best and cheapest, but it may not be desirable to use it everywhere; hence, one of the others may be substituted. Each of the solutions recommended is more than strong enough to kill both hog cholera and swine plague bacteria and they need not be increased in strength.

When swine have become infected while running over tracts of ground, disinfection of such tracts may be regarded as practically impossible. If, however, they have been brought up in pens or in small inclosures, disinfection should be thoroughly carried out. The woodwork of pens may be disinfected by exposing all portions, cracks and corners to the action of any of the solutions mentioned. These may be applied with a broom or any other household article which insures uniform wetting. Whitewash is useful for woodwork of fences, &c., when there is no objection to its appearance. Its action is only exerted at the time of application and after it has dried it will not destroy bacteria subsequently adhering to it. It must, therefore, be applied fresh every time disinfection is needed. For large farms some kind of spraying apparatus would be of great service in insuring uniform distribution of the disinfectant. In the selection care must be exercised, however, owing to the corrosive action of some of the solutions. The disinfection of the surface of the soil over small areas is perhaps best accomplished by the slaked lime or the crude carbolic acid solution. It should be remembered that both preparations may be irritating to the feet of animals immediately after they have been applied. The

feeding-troughs should receive special attention, and after the application of the disinfectant this should be washed away with water, preferably hot or boiling.

If the disease continues to show the virulency and extent shown recently in this State and so common in portions of other States, some special powers should be given Township Boards of Health acting under the directions of this Board and its veterinary assistants. Already the veterinarians whose directions have been closely followed, attest the value of the methods suggested. It is believed that known preventive measures faithfully carried out by owners can prevent or much restrain the spread of the disease.

While the disease now attacks herds that are well kept, we are learning from this and other animal diseases the direct result of ill treatment of our domestic animals.

Dr. Detmers has well said :

"The domesticated animal does not approximate the habits of his pioneer ancestor in point of cleanliness. It is the instinctive habit of the animal to bathe in water and wallow in mud to counteract heat and as a protection against flies; but in a state of nature, when the mud has served its purpose, the animal cleanses himself by friction with the nearest tree; the filthy bed which the domestic animal becomes satisfied to occupy in a state of confinement is never occupied by animals running in the forest, and given opportunity to make and change their sleeping-places at will—in short, when allowed to provide for his own existence, he exercises a more intelligent regard for his wants than is ordinarily exercised for him by his owner, who attempts to supersede instinct by reason."

Cobbold, in his "Treatise on Animal Parasites," says that "swine are not attacked by a greater variety of entozoa than other domesticated animals." The prevalence of these and of various microphytes or "disease organisms," animal or vegetable, in animals is usually the result of the artificial conditions established by man. We are to seek riddance from such destructive animal pests, not by finding specifics for disease, which do not exist, but by finding our way back to natural methods of dealing with animals, and so preventing those immense losses to agricultural and stock-rearing industries, which are so rapidly increasing. Thorough and enforced cleanliness for all domestic animals is for the interests of their owners, because for the welfare of the animals. Impure water, spoiled foods, poor ventilation, filth or imperfect care generally, will tell upon man

or upon beast, and, unfortunately, the innocent owner must suffer with the ignorant and the careless. This and every other epizootic or enzoötic prevailing among animals should lead to a careful study of the indications as to food, habits, care, and all that contributes to their most perfect health.

PIG MEASLES.

This disease depends on an animal parasite in the form of a bladder-worm, the *Cysticercus cellulosus*, belonging to the *Cestoda*, or tape-worm class, the tape-worm being the *Tænia solium*. It is in the pig in the larval form, and when ingested by man becomes developed into the tape-worm—a disease which we have some reason to fear is increasing in this country. Even where the cysts are not in a condition to do harm, the measly pork is a very inferior article of food.

Often the first indications of the disease are that the animal does not thrive. The tongue, carefully examined on its under part, toward its root, will often show bladders from the size of an oat-seed to a pea, slightly transparent and standing out a little from the membrane. These are cysts, like those elsewhere in the body. A sore snout and a roughened voice, slight cough and languor often characterize the disease. Other symptoms occur according to the amount of cysts, unless the sausage machine interrupts the progress. It is pleasant to know that the cysts will not hatch three or four days after the death of the swine, but this does not add to the quality of the pork. The cyst does not hatch in the pig, but only when transferred to another medium, as man. Fleming rapidly sums up the mode of prevention: "As pigs cannot become affected unless they swallow portions of the human tape-worm containing the germs of the parasite, the preventive measures are sufficiently indicated. At the same time, the sanitary authorities should take precautions against pigs of a vagabond disposition ingesting dangerous filth, by forbidding the disposition of human ordure in any but proper places, to which pigs cannot have access." This is also a strong reason against city pigs.

TRICHINOSIS.

This is a disease arising from a parasite or worm known as the trichinæ spiralis. This parasite is harbored or finds a host in swine, and in its "asexual" form encysts itself in the muscles of the pig.

When the raw or half-cooked meat is eaten, digestion disposes of the cysts and liberates their contents. Thus liberated from the cyst, the trichinæ come to their mature sexual period and are capable of procreation toward the third day. Besides the irritation by liberation from the cyst and also of its juices, "in less than five days some of the embryos are born. One trichina may give birth to a couple of thousand of embryos. Over 85,000 have been found in a cubic inch of human muscle." (See Glazier's report, Health Report 1881, page 171.) As the disease has not, so far as we know, been found in any hogs reared in the State, we do not enter into details as to it.

CHICKEN CHOLERA.

This disease causes great loss in some counties of this State. The following quotation will guide to symptoms and methods for prevention :

"The bird which is a victim to this disease loses its strength and its wings droop. The feathers on its body rise, and make it look like a ball. An unconquerable sleepiness overwhelms it. If it is compelled to open its eyes, it appears as if awakened from a profound sleep, and soon closes its eyelids again. Frequently it dies in mute agony without having changed its position. If it happens to move its wings for a few seconds, it is with great difficulty. This disease is caused by a microscopic organism, which M. Pasteur has bred in a suitable manner, and with which he has inoculated guinea pigs and fowls. The inoculation of the pigs did not always produce death, but did produce an abscess, and fowls inoculated with the contents of this abscess soon died. A few drops of a culture of this microbe placed on a piece of bread or meat fed to the fowls is sufficient to cause the infection to enter the intestinal canal, where the little organism multiplies in such great quantities that the excrement of the fowls thus infected kills others which are inoculated with it. These facts permit us easily to account for the manner in which the disease is propagated in poultry-yards.

"Evidently the excrements of the sick birds are the great cause of contagion. Nothing can be more easy than to arrest this by simply isolating the birds for some days, by washing the yard with an abundance of water, and especially with water acidulated with a little sulphuric acid, which easily destroys the microbe, and by removing all the manure before admitting the birds again. All cause of conta-

gion will have been removed during this period of isolation, because the birds already attacked will have died, so rapid is the disease in action.

"By a certain change in the culture of this microbe, its virulence may be diminished, and while the fowls inoculated with the most virulent virus are all killed, those infected with the diluted virus sicken but do not die. If they are allowed to recover, and are again inoculated with the more infectious virus, the injuries produced are local, and do not cause death. Chicken cholera is, then, of the character of those virulent diseases which do not repeat themselves. Suppose that this microbe of the diluted virus may be fixed in its proper variety, and that we are not always obliged to have recourse to its original propagation when we wish to use it, it may be made to serve as a veritable vaccine, transmissible from animal to animal as the vaccine of variola is transmissible from man to man."

RABIES, OR HYDROPHOBIA.

This direful disease is only noticed in order to insist upon more rigid muzzling of dogs and to quote the State law as to it, which is as follows :

STATE LAW AS TO MAD DOGS.

"The Mayor of any incorporated town in this State, by the advice and consent of the Common Council of the town, and the Township Clerk of any township in the State, by the advice of the Township Committee, be, and are hereby, authorized, whenever in his and their opinion the public safety may require, to issue his proclamation authorizing the destruction of all dogs, male and female, found running at large within the limits of the town, except such as shall be properly muzzled with a wire muzzle about the nose, securely fastened, after one day's public notice by written or printed handbills; *provided*, that nothing in said proclamation shall apply to a dog or dogs of a non-resident passing through the town accompanied by the owner or owners of such dog or dogs." (Rev. L. 1709-1877, p. 25, 58, § 1.) A Board of Health would also have jurisdiction under Items II. and III., Sec. 12, Ch. LXVIII., Laws of 1887.

SOME GENERAL SUGGESTIONS AS TO THE CARE OF ANIMALS.

It needs, first of all, to be recognized by all farmers, stock-raisers or dealers in animals, that all physical life has its laws, and that therefore the health and welfare of animals depend upon their natural constitutions, their surroundings and exposure, and the adaptation of their care and management to their physical needs. This simply means that as to air, ventilation, heat and cold, food, exposure to draughts or storms, protection from disease and treatment when not well, as to cleanliness, rubbing or carding, exercise and all management, there is a law of life and health, and that it needs to be known and practiced. Cattle kept in rows, with no partitions of stalls, with too little light or air, or kept standing in stables where sunlight never enters, are not properly kept. Free exercise in the open air is needed by most animals as well as protection from severe storms and winds and heavy dews. Wet bedding or manure heaps or pits are often injurious. The whole subject of feeding needs careful study. Ice-water may not only founder a horse when he is hot, but heavy draughts of cold water may derange the stomach or retard the digestion of recent food. Animals are often injured by drinking impure water. As to impure air-supply, Smith, in his recent work on Veterinary Hygiene, speaks thus :

“The lungs of a horse will contain nearly one and one-half cubic feet of air, and at each inspiration about 140 cubic inches are drawn through the trachea ; the surface of the lungs to which this amount of air is exposed, is calculated to be equal to 289 square feet. Air, then, containing impurities, is exposed to an absorbent area within the body equal to five and a half times the surface of the skin.

“Air is rendered impure by the products of respiration, and the decomposition of excreta ; by the influence of large manufacturing towns and thickly-populated cities, the air becoming vitiated by the products of combustion and the gases of trades ; and by disease poisons given off from the bodies of sick men and animals. For convenience of description, therefore, the impurities of air are divided into organic, inorganic and gaseous.

“*Organic impurities*, in small proportions, always exist in the air of places occupied by animals ; and in order to distinguish between the amounts and their effects, they have been divided into neutral,

putrid and organized. Such a division is quite an arbitrary one, and is open to objection.

"Organic impurities exist in the form of solid particles, accompanied in many cases by gases which are given off from them. These particles, such as bacteria, vibriones, spores of fungi, are only of microscopic dimensions; others, such as vegetable fiber, epithelial cells, &c., are much larger. The organic matter in the air can be collected; that from the human breath has been condensed and examined. Ehrenberg has discovered 200 forms of organism in air thus collected.

"We know very little about these living particles of matter found in the air; they are largely met with in prisons, hospitals, houses and stables, wherever the air is impure, and in a lesser degree they exist everywhere. We can filter them from the air, and can also destroy them by the action of chemical agents. On this process of filtration and disinfection of organic particles is founded the basis of antiseptic surgery.

"Amongst these organized particles are also others, which form a distinct group. They are characterized as being the *materies morbi*, or disease-producing bacteria; such, for instance, are the poisons of the pleuro-pneumonia, tuberculosis, sheep-pox, cattle plague, influenza and, probably, anthrax and glanders. That particles of disease-producing matter can be conveyed by the air is well known, and the following experiment, made by Kuchenmeister, is quite conclusive: A sheep was made to breathe, during one hour, air which was made to traverse a shirt worn by a small-pox patient for twelve hours; in five days the animal was affected with variola.

"The organic matter found in air vitiated by respiration and transpiration is made up of cast-off epithelium from the mouth, air-passages and skin; organic vapors from the lungs and skin whose constitution is imperfectly known; fæces in fine division, and vapors derived from the decomposition of materials from the intestinal and urinary passages. This organic matter is accompanied by carbonic acid gas and water vapor. Regarding the latter, the cutaneous and pulmonary transpiration from a horse, while in the stable, is equal to about two gallons of water in twenty-four hours; for the ox it is about one and a quarter gallons. The vapor from the skin contains organic matter and carbonic acid.

"It is this organic matter found in buildings which obtains such an important place in the hygiene of air. We have previously mentioned that it has been condensed and collected from the air; it may also be drawn through distilled water by means of an aspirator, and its presence detected on analysis. Angus Smith found that condensed from the air to be a thick, oily liquid, smelling of perspiration, and capable of rapid decomposition. This air was taken from a crowded room. If organic matter derived from the skin and lungs of human beings possesses such objectionable properties, what must the organic matter from the habitations of animals possess, when we consider that

not only are the skin and lungs acting, but that we have deposited in the place where they live the discharges from the bowels and kidneys?

"When organic matter is produced it rapidly adheres to the walls, woodwork, &c., and there, parting with its water, it becomes fixed, forming a greasy coating.

"This is the reason why the peculiar penetrating odor of organic matter, in badly-ventilated stables, is so difficult to remove, even with free perflation of air; it hangs to woodwork, walls and ceiling, and is readily detected on entering a building of this description, or the decks of transport ships.

"This organic substance, owing to the moisture in the air, is constantly undergoing change, giving out carbonic acid, ammonia and sulphuretted hydrogen—the blackening of the paint of such habitations is due to the latter gas. From observations made by Dr. de Chaumont and others, it has been shown that the organic matter in the air of buildings is in proportion to the carbonic acid of respiration. This is a most important point, for it affords us a ready index to the purity of the air by determining the amount of CO_2 present in it. It must be distinctly repeated that it is not the actual presence of a large amount of CO_2 in the air which is to be dreaded, but the certain indication which this affords of the large amount of organic matter which is present."

The following are some *sanitary precautions* and directions applicable in almost all cases and as to all animals:

TO AVOID CONTAGION.

I. Never introduce a newly-purchased animal of any kind into the general herd for a month or more, unless you know fully its previous keeping or ownership, or have a warranty that it has not been exposed to diseased animals. We could give many instances in this State where whole herds have been infected through a single purchase; avoid especially city cow-pens, as these are great breeders of disease.

II. Let all animals be kept in a cleanly way and with regard to health. No domestic animal is benefited by filth, and most of their diseases arise therefrom or are intensified and made to extend. They thus become enzoötic or epizoötic, words which mean the same in relation to animals that endemic and epidemic do as to human beings.

III. If an animal is taken sick or dies in a stall or pen or yard, let it remain vacant until you know what the disease was; and let it be cleansed before any other animal is put therein.

IV. Disinfectants, cleanliness, fresh air and whitewash are always valuable. The free and frequent use of fresh-slaked lime and lime-wash about all buildings in which animals are kept, cannot be too much insisted upon. Circular 64 of this Board names several artificial disinfectants. One of the most available is this: Dissolve sulphate of iron (copperas, or green vitriol), two pounds to a gallon or sixty pounds to a barrel of water, stirring it from time to time so that it shall be fully dissolved; a pint of crude carbolic acid added to the solution increases its power. The solution can be freely sprinkled by means of a watering-pot every two or three days, according to the character of the malady. Other disinfectants are also named in the circulars of the Board of Health (third and fourth reports) to householders, city authorities and Boards of Health, and in the circulars which accompany this one.

V. If you have occasion to go into yards where there is some disease, do not touch or handle the cattle if you have those of your own to attend to, or do not go directly to your own yard or stables. The danger is chiefly in actual contact or in going to other animals without free access to air.

VI. The person attending sick animals should not milk or attend to any other animals on the same farm, to which the disease may be imparted.

VII. Read carefully the laws of this State as to contagious diseases of animals.

Copies of this and all other circulars can be had by addressing postal to State Board of Health, Trenton, N. J., Ezra M. Hunt, Secretary.

EXTRACTS FROM THE
REPORT OF THE DAIRY COMMISSIONER
For 1891.

GEORGE W. M'GUIRE.

EXTRACTS FROM THE REPORT OF THE DAIRY COMMISSIONER.

OLEOMARGARINE.

The oleomargarine business, during the fall and winter of 1890 and 1891, shows a large increase over the transactions of the previous year. This was due no doubt to the high price of butter. Our Inspectors were kept busy during this period visiting stores throughout the State to see that the law was being complied with. As I stated in my last report, the law does not forbid the sale of oleomargarine, yet there seems to be an impression in the minds of some persons that its sale should be entirely suppressed by the officers of this department.

We have no power to do this; the act does not prohibit either the manufacture or sale of "imitation butter," but does provide that it shall be manufactured and sold only under certain regulations.

It has been my aim to confine the sale of the article strictly within the limits of the law, the intent of which is to label all "imitation butter," so that the buyer will not be deceived, but experience has shown that the law is not sufficient to meet the cases of deception which are frequently practiced, and it is only by constant watchfulness on the part of the Inspectors that a much larger illegal sale is prevented.

One of the greatest difficulties we meet in dealing with this traffic is the very ingenious method used in coloring the article. Oleomargarine, in its natural state, is of a whitish color, but the product on the market is the color of genuine butter, and our analysis shows that this color is not produced by the addition of any forbidden artificial matter, but by some secret process in the manufacture. I believe the public will be better protected from this imposition and much of the fraudulent sale checked, if the Legislature enact a law forbidding the

sale of imitation butter colored in semblance of natural butter, by whatever means produced. If the matter of color could be adjusted the whole question as to its identity would be practically settled. The statements that frequently appear in the newspapers to the effect that oleomargarine as an article of food is steadily winning its way to public favor, are based principally upon the following figures given in the reports issued by the Commissioner of Internal Revenue:

The tax receipts on oleomargarine were, for eight months for the years—

1887.....	\$723,948 04
1888.....	864,139 88
1889.....	894,247 91
1890.....	786,291 72
1891.....	1,077,924 14

It may be true that oleomargarine, when properly made of clean, healthful materials, is a cheap and wholesome substitute for butter, and would benefit the poor man, could he buy it at genuine oleomargarine prices. But our Inspectors have found that oleomargarine is often palmed off to the buyer as good creamery butter, at the enormous price of 40 cents per pound.

The annual report of the New York Produce Exchange for 1889–90 and 1891 states that the average prices of oleomargarine at New York were as follows:

1886.....	$6\frac{5}{16}$ to $6\frac{1}{2}$ cents per pound.
1887.....	$6\frac{3}{8}$ to $6\frac{1}{2}$ “ “ “
1888.....	$7\frac{3}{4}$ to $7\frac{1}{8}$ “ “ “
1889.....	$6\frac{3}{8}$ “ “ “
1890.....	$5\frac{3}{4}$ “ “ “

This shows that the cost of manufacture cannot be more than eight cents per pound.

By our Inspectors' reports the average price paid for oleomargarine, bought as such, was 20 cents per pound, and very frequently the *same* article was sold to them as *butter* at 40 cents per pound.

The same principle involved in the decision of the United States Supreme Court in the Iowa prohibition case, to the effect that no State has power to prohibit the importation of liquors from another State, or prohibit their sale by the importer in the original packages, within its own borders, has been applied to the sale of oleomargarine.

MILK INSPECTION.

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Prominent dealers in New York and Pennsylvania, where the sale of oleomargarine is virtually prohibited, took advantage of this decision, purchased goods in original packages and induced storekeepers in this State to handle the same. Especially was this the case in the southern part of our State, and for a long time our Inspectors were kept busy fighting the illegal traffic, but when it was found that the stuff could not be sold without peril to the dealers, several of them having been arrested and fined, this business was gradually given up and genuine dairy butter took its place.

Section 7 of the law making the possession of oleomargarine by any hotel, restaurant or boarding-house keeper *prima facie* evidence of their intent to sell the same, has never been passed upon by the Supreme Court. Several convictions have been had in the lower courts, but they have never been carried up. During the past summer Inspectors visited all the principal hotels at the sea-side and other resorts, in search of oleomargarine. The article was found in a number of hotels, although every effort was made to conceal it from the Inspectors.

Complaints were made against two hotel proprietors at Atlantic City, one of whom pleaded guilty and paid the fine of \$100. The other case is still pending in the court. Complaint was also made against a hotel-keeper at Asbury Park and judgment was rendered against him, but the case was appealed and is now pending in the Common Pleas of Monmouth county.

There seems to be conflicting opinions as to the liability of hotel-keepers under this section of the act, but the matter will be fully tested by the Supreme Court, as the case now pending in the Monmouth county courts will no doubt be brought there for final adjudication.

MILK INSPECTION.

During the past year we have operated our milk inspection on a different plan.

Where formerly our Inspectors took a number of samples in each place without regard to the lactometer readings, this year samples collected for analysis were limited to those shown by the lactometer

to be suspicious. Many samples were also received by dealers and producers to learn the quality of the milk they were handling. In such cases no preliminary test was made, the samples being merely sealed and sent to the chemist, and are included in the total number of samples analyzed.

Every section of the State has been visited during the year, and the milk-supply of every principal city and town has been examined.

The large cities claimed the most of our attention, where schemes for adulterating milk are so common. The sea-side resorts have received our especial attention, and with but three exceptions—where prosecutions followed—the milk-supply, under the watch of alert Inspectors, was kept up to a high standard.

Samples of milk supplied to the public and charitable institutions, schools and colleges of the State, on analysis proved to be far above the State standard, and did credit to those having charge of the same.

The Legislature last year passed a supplement to the Milk law, requiring the Inspector to furnish a duplicate sample to every person from whom he took a sample of milk.

The act referred to has had no special bearing on the operation of the law, as it has always been the custom to tender the seller a sample, but the offer is seldom accepted. We are also required to tender a statement in writing of the cause of taking the sample.

Our supervision of the milk-supply has extended, as far as possible, to city dairies and those located in the suburbs, with a view to enforcing more perfect sanitary measures. These inspections began in July, and each stable has been visited a number of times. The reports of the Inspector detailed to do this work show that outside of the question of the adulteration of milk there exists great necessity for frequent inspections of dairies of this character.

Following is the number of stables inspected and the number of cows contained in them :

	Stables.	Cows.
Hudson.....	44	959
Essex	82	902
Mercer.....	5	49
Passaic	45	395
Total	176	2,305

The instruction given the Inspector in the work was as follows :

Report name of owner.
 Report location.
 Report condition of stable.
 Report condition of cows.
 Report number of cows.
 Report kind of food used.
 Report condition and purity of milk.
 Report care taken in washing cans.

I am glad to say that the inspections in the vicinity of Newark, Paterson and Montclair in nearly all cases showed the cows to be well housed and cared for and the stables to be clean and tidy ; this, however, cannot be said of many of the stables in Hudson county. The following reports, one to this department by Inspector Tracy, and the other by an officer of the United States Department of Animal Industry, will give an idea of the condition of one of the worst-kept stables in Hudson county :

“This is the most filthy stable in Seacaucus ; owner has 11 cows, 2 bulls and 30 hogs all under one roof.

“The stable reeks with rotten filth. Feed, swill gathered from New York hotels, which is stored in the same barn and boiled there. Milk dirty, and can only be made salable by straining through thick muslin or cloth. Cows covered with filth. Owner claims he selects the best of the swill and mixes it with meal to feed cows.

(Signed)

“JOHN C. TRACY,

“Dairy Inspector.”

The report of Inspector Walrath, of the United States Department of Animal Industry, made to the State Board of Health on the same stable, is as follows :

“Swill-stable ; cows standing in filth of all sorts ; gangway choked up with partially rotted garbage and swill. The location of this place in the swamp makes it impossible to secure any drainage.

“The barn is taken up by a boiling-vat, the refuse from which runs out, forming large pools of greasy slop wherever there is a little depression in the ground.

(Signed)

“J. A. WALRATH,

“Inspector.”

The owner of this place has at last built a new barn and is now conducting his business with a little more regard to cleanliness.

It is as essential to the average farmer to have a systematic care of his dairy as to the merchant to buy and sell, but many of the class of men owning these stables have an eye only to the cash returns, without regard to the health of these ill-fed, poorly-housed creatures, or the consequences arising from the use of this grade of milk.

There are other stables in this locality kept but little better than this. I think the proper remedy to bring about a necessary reform is vigorous action by the Local Boards of Health.

These stables should be allowed to exist only when conforming strictly with certain sanitary regulations, which should be enforced by regular and systematic inspections by an officer of such Boards.

In the suburbs of Newark, Paterson and Montclair 82 stables, containing 902 cows, were inspected and found to be in good condition. In nearly all instances the cows had access to pure water. The principal food given, however, is brewers' grains, and in many cases almost entirely, which, of course, produces an impoverished quality of milk.

After accounts of other inspections of dairies, report is made of a herd examined and quarantined in Sussex county, and eight of the number, being diseased, were slaughtered, and the premises were disinfected. (See report of Dr. H. F. Formad in Report on Contagious Diseases of Animals, page 216).

The Commissioner says: "While we have since occasionally found a tuberculous cow, generally speaking, dairy herds, except in large city dairies, are free from the malady."

FOOD AND DRUGS.

During the past year the inspection of articles of food and drugs has shown a decided improvement in some instances over previous years. The total number of samples analyzed, other than milk, have been 1,010, of which number 360 were below the legal standard, or adulterated. The method which the department has followed has been to send a warning notice to the seller, calling his attention to the fact that he has sold an adulterated article. This has worked very well, and numerous letters which have been received show that the retailers, as a rule, approved of the law, and were glad to be

informed of the fact. Letters which have been received from the wholesalers give evidence that in a number of instances, especially in the case of vinegar, the retailers have returned the articles, not knowing at the time of the sale that the same were adulterated. Milk and butter have already been mentioned, and no further remarks are here necessary. There has been a most decided improvement in the purity of the lard sold during the past year. Samples have been taken in all parts of the State, and of the 212 samples analyzed but 20 were adulterated, showing 9.4 per cent. adulteration as compared with 32.7 per cent. in 1890. The seller now, in case he has adulterated lard, has the package marked and states that it is a "compound."

During the past year a product termed "Cottolene" has been put on the market as a substitute for lard. It is sold under that name, and the manufacturers not only acknowledge that it contains no hog fat, but offer a reward in case any is detected. It appears to be composed of beef fat and cotton-seed oil, the mode of manufacture, &c., being a trade secret. It possesses a slight color, and could not well be mistaken for lard. The manufacturers claim that it is superior to lard for many purposes.

VINEGAR.

There has been a slight improvement in the purity of the vinegar sold. During the year 279 samples were obtained, sold as "apple cider vinegar." Of this number 114 were found on analysis not to be "apple cider vinegar," and of those which were "apple cider" 70 were found to be below the legal standard of four and one half (4.50) per cent. of absolute acetic acid. In this latter case, while the vinegar was what it was represented to be, the strength was not what it should have been, caused by the vinegar not having undergone sufficient fermentation. It has been demonstrated in other States, that if the manufacturer allows the cider to properly ferment, and is not in too great a hurry to sell his product, there is no difficulty in obtaining 4.50 per cent. acetic acid; in fact, he will obtain nearer six per cent. In the case of vinegar sold as "apple cider," which is made from acetic acid, water, and a small amount of coloring matter, this is a fraud only equaled by the sale of oleomargarine for butter. At the same time it is an injury to our farmers, who frequently have made a large quantity of vinegar and are unable to compete with the bogus article in price, while the consumer pays the same for the two. The greatest

amount of the bogus cider vinegar is sold in South Jersey, as well as the vinegar below the standard in strength. But few samples of the former have been obtained in other parts of the State, and the strength of the genuine has seldom fallen below five per cent.

The amount of adulteration, that is to say, samples obtained for cider which were not, compared with the entire number, was 40.9 per cent., and of those which were cider 42.4 per cent, were below the standard.

COFFEE.

In the report for 1890 attention was called to an adulterated coffee, composed of imitation and genuine berries. This article was soon driven from the State, but its place was taken by an article termed by various trade names, such as "Mocha and Java Screenings," "Broken Java," "Roasted Crush Java," "Broken Coffee," &c. On examination these articles appeared to consist of about 40 per cent. of coffee, the remaining 60 per cent. being composed of chicory, peas and cereals. As an inducement to the purchaser, it was often put up in a Mason glass jar, or in a tin can, which could be made use of after the coffee was used. Notices were sent to the retailers, and in one case where the sale was continued suit was brought. The defense was that it was marked with the word "Compound," but this did not comply with the regulation, and no one would have thought that it referred to the presence of anything but coffee of the kinds mentioned. The case was decided against the defendant, who took an appeal to the higher court, where it was tried on December 31st, and has not at this time been decided. Owing to the discussions on the part of the defendant's counsel, as to the sale of a coffee mixture, the State Board of Health passed a resolution regarding the matter, endeavoring to make clearer their previous resolution, and to prevent any further discussion, after the passage of the resolution, I prepared and sent to all the wholesale dealers the following circular-letter:

"TRENTON, N. J., October 13th, 1891.

"DEAR SIR—At a recent meeting of the State Board of Health the following resolution in relation to the sale of coffee mixtures was passed, and hereafter such mixtures must comply with the regulation as expressed in the resolution:

"*Resolved*, That hereafter the following be the limit of permissibility as to coffee:

“‘Mixtures of coffee, with chicory, peas or any cereals, may be sold if each package is marked ‘Coffee Mixture;’ *provided*, that said mixture shall contain at least 25 per cent. of true coffee. The words ‘Coffee Mixture,’ and the per cent. of true coffee it contains, shall be printed on each package in clear letters, not smaller than great primer.’

“Yours truly,

“*Commissioner.*”

If one wishes to obtain pure coffee the best way to do so is to buy the whole berry and grind it at home. If there are any bogus berries present they are readily distinguished on an inspection, but in case “ground” or “broken” coffee is purchased, it will, as a rule, be found to be adulterated with chicory or chicory and cereals. The following article from the New York “World” shows to what an extent adulterated coffee is sold to consumers, and the experience of this department shows that the statement is not overdrawn :

“The average bulk of the genuine coffee imported into the United States is 8,000,000 bags, or 180,000,000 pounds per annum. Experts estimate that fully 20 per cent. of the coffee sold to consumers is bogus, which raises the consumption to 216,000,000 pounds. Taking 30 cents per pound as the average retail price, the people of America pay \$65,000,000 every year for this one article of food, of which \$13,000,000 is paid for roasted and ground beans, peas, rye, or a manufactured article in no way resembling the Brazilian berry. To this must be added the production and sale of what are called ‘coffee substitutes.’ So extensive is this business that it is quite safe to say that consumers pay \$12,000,000 for what they believe to be cheap coffee. This raises the total expenditure to \$77,000,000, and it represents a sale of 276,000,000 pounds, for the ‘substitute coffee’ usually sells for 20 cents per pound. It will thus be seen that 96,000,000 pounds of bogus coffee are sold in the United States every year, and some estimates place it at 120,000,000 pounds. Taking the lowest figures, \$25,000,000 are received for substances which can be profitably placed on the market at 6 cents a pound. The manufacturers, therefore, receive \$6,000,000 for their goods, while retailers gain a profit of \$18,000,000. There are two kinds of bogus coffee—an imitation bean and the ground article. The bean is the most difficult to produce, and it is only recently that actual success in this direction has been attained. The bogus bean must not only look like the genuine berry when raw, but it should be capable of taking a proper color when roasted. A very good specimen is now manufactured in Philadelphia and Camden, being composed of rye flour, glucose and water. The soft paste is then moulded and carefully dried. To the eye of an expert the presence of this imitation is easy

of detection and it cannot be used to any great extent among wholesalers. But when coffee goes to the retailer, adulteration begins. Sometimes the retailer is deceived, but nine times out of ten he is the one who introduces adulteration. The ground article is very easily produced in the proper color, and an aroma is infused by using strong decoctions of coffee essence. When mixed with real coffee even the expert eye and tongue may be deceived, while to the ordinary consumer it seems to be the genuine product. Bogus coffee beans have only a slight resemblance to the natural berry, for though they possess the proper form, the cicatrice on the inner surface is too smooth. Then again the gray color of the raw bean is not quite up to the mark, but when these manufactured beans are roasted with five per cent. of genuine coffee they find a ready sale. These bogus beans can be made at a cost of \$30 per 1,000 pounds, and when mixed with 50 pounds of pure coffee the whole 1,050 pounds cost \$37.50, or 3 $\frac{3}{4}$ cents per pound, so that a profit of nearly 100 per cent. is the result. There are any number of 'coffee substitutes,' the Hillis variety being the most successful. This company is already manufacturing 10,000 pounds per week, it being sold by the barrel to the retailers in nearly all the New England, Middle and Western States. The profits of this concern are supposed to be \$300 per day, and its operations have reached such a scale that the stockholders were recently offered nearly \$1,000,000 for their secret and business, but it was declined. No one accustomed to coffee-drinking would imagine that a decoction of this stuff was like either Mocha or Rio, but when mixed with four times its bulk of genuine coffee only an expert could detect the imposition. The manufacturers of these 'coffee substitutes' claim that they are not violating the law of adulteration of food products, because they do not sell their goods as coffee, but simply as a substitute. While this may be true, it does not apply to the retailer, who mixes the bogus stuff with good coffee and sells the whole as the genuine article. Though manufacturers may be beyond the penalties of the Adulteration law, they should be suppressed, for without them coffee adulteration by retailers would be impossible. When it is remembered the American people are compelled to pay \$25,000,000 for ingredients that can be manufactured for one-fifth the sum received by coffee-growers, the necessity for the suppression of this nefarious trade is apparent. Oleomargarine cannot be sold as butter, neither should 'coffee substitute' be made to masquerade under the name of 'Java,' 'Mocha,' or 'Rio.' The production of artificial coffee has also received some attention in Germany, where an imperial decree has been issued forbidding the manufacture and sale of the machines for producing the artificial beans, which certain German newspapers have recently advertised. These artificial German beans are not intended in themselves as a beverage, but are to be used in trade for mixing with the genuine article."

REPORT
OF THE
STATE GRANGE OF NEW JERSEY,
PATRONS OF HUSBANDRY.

(317)

STATE GRANGE OF NEW JERSEY,

PATRONS OF HUSBANDRY, 1892.

OFFICERS.

Master	JOHN STATESIR.....	Colt's Neck, Monmouth county.
Overseer	HENRY F. BODINE.....	Locktown, Hunterdon county.
Lecturer	A. S. APPELGET.....	Hightstown, Mercer county.
Steward	DAVID S. ADAMS.....	Mickleton, Gloucester county.
Assistant Steward.....	EDMUND BRADDOCK	Medford, Burlington county.
Chaplain	FRANKLIN DYE	Trenton, Mercer county.
Treasurer	C. A. RULON.....	Swedesboro, Gloucester county.
Secretary	M. D. DICKINSON.....	Woodstown, Salem county.
Gate-Keeper	E. E. HOLCOMBE.....	Mount Airy, Hunterdon county.
Ceres	ZILLAH H. ADAMS.....	Mickleton, Gloucester county.
Pomona	LAURA E. CUBBERLEY.....	Hamilton Square, Mercer county.
Flora	KATE B. LIPPINCOTT.....	Hartford, Burlington county.
Lady Assistant Steward.....	HANNAH C. HOLCOMBE.....	Mount Airy, Hunterdon county.

EXECUTIVE COMMITTEE.

JOHN STATESIR.....	Colt's Neck, Monmouth county.
JAMES H. BAIRD.....	Marlboro, Monmouth county.
WM. B. LIPPINCOTT	Hartford, Burlington county.
JOHN T. COX	Readington, Hunterdon county.
THOMAS BORTON.....	Mullica Hill, Gloucester county.

(State Grange meets on the third Tuesday in December, 1892.)

DEPUTIES.

Burlington.....	JOHN M. LIPPINCOTT.....	Moorestown, Burlington county.
Camden	AMOS EBERT.....	Ashland, Camden county.
Cumberland	JOSEPH B. HILLIARD.....	Bridgeton, Cumberland county.
Essex	J. H. M. COOK.....	Livingston, Essex county.
Gloucester.....	D. W. SITHENS.....	Mullica Hill, Gloucester county.
Hunterdon and Warren.....	H. F. BODINE.....	Locktown, Hunterdon county.
Sussex.....	LEVI HALL.....	Deckertown, Sussex county.
Mercer and Middlesex.....	A. S. APPELGET.....	Hightstown, Mercer county.
Ocean, Somerset, Atlantic, Bergen, Cape May, Hudson, Passaic and Union.....	J. B. ROGERS	1195 Broad St, Newark, N. J.
Monmouth.....	JAMES H. BAIRD.....	Marlboro, Monmouth county.
Morris	— — — — —	— — — — —
Salem	RICHMAN COLES.....	Woodstown, Salem county.

SUBORDINATE GRANGES.

Number.	NAME	MASTERS.	P. O. ADDRESS.	SECRETARIES	P. O. ADDRESS.
5	Swedesboro.....	Barclay D. Kille.....	Swedesboro, Gloucester county.....	Emma C. Warrington..	Swedesboro, Gloucester county.
8	*Moorestown.....	Jacob W. Stiles.....	Fellowship, Burlington county.....	Sallie S. Dudley.....	Hartford, Burlington county.
9	†Woodstown.....	C. F. Moore.....	Woodstown, Salem county.....	A. W. Richman.....	Woodstown, Salem county.
11	Vineland.....	Richard Johnson.....	Vineland, Cumberland county.....	Mary H. Lee.....	Vineland Cumberland county.
12	Ringoes.....	P. H. Hartwell.....	Lambertville, Hunterdon county.....	Bessie De Sked.....	Linvale, Hunterdon county.
14	Edgewood.....	.....	.....	.....	.....
16	Hopewell.....	R. P. Jones.....	Shiloh, Cumberland county.....	J. B. Hoffman.....	Shiloh, Cumberland county.
18	Cumberland.....	John Tyler, Jr.....	Greenwich, Cumberland county.....	Morris Goodwin.....	Greenwich, Cumberland county.
23	Frankford.....	.....	.....	.....	.....
26	Harrisonville.....	Frank Brown.....	Monroeville, Salem county.....	S. S. Conover.....	Harrisonville, Gloucester county.
32	Bridgeport.....	J. W. Guest.....	Swedesboro, Gloucester county.....	C. A. Rulon.....	Swedesboro, Gloucester county.
36	Medford.....	Isaac W. Nicholson.....	Medford, Burlington county.....	Anna R. Ballinger.....	Medford, Burlington county.
38	†Haddon.....	Geo. T. Haines.....	Haddonfield, Camden county.....	William C. Nicholson.....	Haddonfield, Camden county.
39	Mantua.....	H. M. Leap.....	Wenonah, Gloucester county.....	Joseph Noblit.....	Wenonah, Gloucester county.
43	Hope.....	Jos. S. Glaspey.....	Bridgeton, Cumberland county.....	P. L. Wheaton.....	Bridgeton, Cumberland county.
49	Rancocas.....	Joseph Lundy.....	Rancocas, Burlington county.....	J. B. Hilyard.....	Rancocas, Burlington county.
50	Pemberton.....	Theodore Budd.....	Pemberton, Burlington county.....	Henry R. Lippincott.....	Pemberton, Burlington county.
51	Mullica Hill.....	George C. Tonkin.....	Mullica Hill, Gloucester county.....	James White.....	Mullica Hill, Gloucester county.
56	Readington.....	Walter H. Opie.....	Readington, Hunterdon county.....	Wm. Connet.....	Readington, Hunterdon county.
57	Centre Grove.....	J. B. Hilliard.....	Bridgeton, Cumberland county.....	Anna H. Earl.....	Millville, Cumberland county.
58	Columbus.....	Charles Drew.....	Trenton, Mercer county.....	Robert Taylor.....	Columbus, Burlington county.
60	Course's Landing.....	E. Atkinson.....	Woodstown, Salem county.....	Emma J. Steward.....	Sharptown, Salem county.
61	Crosswicks.....	Alfred Satterthwait.....	Crosswicks, Burlington county.....	Elizabeth A. Rogers.....	Crosswicks, Burlington county.
64	Pennington.....	John Fleming.....	Pennington, Mercer county.....	S. B. Ketcham.....	Pennington, Mercer county.
73	Ewing.....	Wm. H. Cadwalader.....	Trenton, Mercer county.....	Wallace Lanning.....	Trenton, Mercer county.
77	Mercer.....	A. L. Holcombe.....	Hopewell, Mercer county.....	W. I. Phillips.....	Hopewell, Mercer county.
78	Wantage.....	George Vandruff.....	Deckertown, Sussex county.....	Belle Dewitt.....	Deckertown, Sussex county.
79	Hamilton.....	David Lee.....	Hamilton Square, Mercer county.....	Mamie E. Cubberley.....	Hamilton Square, Mercer county.
81	Friesburg.....	Joseph G. Pierson.....	Friesburg, Salem county.....	C. F. Dickinson.....	Cohansey, Salem county.

SUBORDINATE GRANGES—*Continued.*

Number.	NAME.	MASTERS.	P. O. ADDRESS.	SECRETARIES.	P. O. ADDRESS.
85	Williamstown....	Henry Linn.....	Williamstown, Gloucester county..	Joseph J. Ayares.....	Williamstown, Gloucester county.
88	Locktown.....	Uriah Sutton.....	Locktown, Hunterdon county.....	W. W. Bodine.....	Locktown, Hunterdon county.
90	Blackwood.....	Albert W. Batten.....	Blackwood, Camden county.....	C. C. Stevenson.....	Blackwood, Camden county.
92	Monmouth.....	J. H. Denise.....	Freehold, Monmouth county.....	W. H. Du Bois.....	Marlboro, Monmouth county.
98	Allentown.....	Lawrence Tilton.....	Allentown, Monmouth county.....	G. W. Tilton.....	Ellisdale, Monmouth county.
99	Liberty.....	S. B. Wells.....	Bradevelt, Monmouth county.....	Nettie Wells.....	Bradevelt, Monmouth county.
101	Sergeantsville.....	Lewis Case.....	Sergeantsville, Hunterdon county	W. D. Axtell.....	Sergeantsville, Hunterdon county.
104	Livingston.....	C. H. Farley.....	Livingston, Essex county.....	A. W. Harrison.....	Livingston, Essex county.
105	2 Morris.....	D. A. Hopping.....	Hanover, Morris county.....	Wm. F. Ely.....	Madison, Morris county.
106	Kingwood.....	A. G. Hawk.....	Baptisttown, Hunterdon county..	J. H. Stull.....	Barbertown, Hunterdon county.
107	Caldwell.....	R. C. Campbell.....	Caldwell, Essex county.....	S. Ezra Harrison.....	Caldwell, Essex county.
108	Roseland.....	W. W. De Camp.....	Roseland, Essex county.....	Lillian De Camp.....	Roseland, Essex county.
109	Enterprise.....	Wm. C. Bates.....	Parsippany, Morris county.....	A. L. Cobb.....	Parsippany, Morris county.
110	Warren.....	Nicodemus Warne.....	Broadway, Warren county.....	W. F. Pursell.....	New Village, Warren county.
111	Mickleton.....	Walter Heritage.....	Mickleton, Gloucester county.....	Hannah L. Haines.....	Mickleton, Gloucester county.
112	Lyons Farms.....	Joseph B. Ward.....	Lyons Farms, Union county.....	A. P. Morris.....	Lyons Farms, Union county.
113	Pohatcong.....	D. C. Donnelly.....	Springtown, Warren county.....	A. A. Painter.....	Shimer, Warren county.

POMONA GRANGES.

1	Burlington.....	Edwin Dudley.....	Medford, Burlington county.....	F. S. Zelle.....	Jacksonville, Burlington county.
3	Hunterdon.....	I. H. Hoffman.....	Baptisttown, Hunterdon county...	J. B. Fisher.....	Sergeantsville, Hunterdon county.
5	Mercer.....	.....	.....	.....	.....
6	Salem.....	E. Atkinson.....	Woodstown, Salem county.....	Georgie A. Duell.....	Woodstown, Salem county.
8	Gloucester.....	Geo. W. F. Gaunt.....	Mullica Hill, Gloucester county...	Mary R. Brown.....	Swedesboro, Gloucester county.
9	Center District...	R. F. Harrison.....	Roseland, Essex county.....	D. A. Hopping.....	Hanover, Morris county.

* Meets from December 1st to April 1st every Thursday at 2 p. m.; rest of the year the first and third Thursdays in each month at 3 p. m. † Meets every Wednesday evening. ‡ Meets May 1st to November 1st, seventh-day evenings; November 1st to May 1st, fourth-day afternoons. § Meets first and third Saturday evenings of each month.

REPORT OF THE STATE GRANGE.

Mr. President and Members of the State Board of Agriculture of New Jersey—The Order of Patrons of Husbandry has passed the quarter-century anniversary of its birth. For twenty-five years it has been laboring for the material, social and intellectual advancement of the farmers of America, and not without considerable success. It has organized the farmers of the United States as they were never organized before.

From a very humble and modest beginning, with but few meetings scattered about the country years ago, it has grown until at least a million and a half meetings are now held in a year.

It has broadened the field of usefulness of the farmers' wives and daughters, and prepared them for their place of equality with men in the true Republic.

It has at all times fostered the cause of education, and been instrumental throughout the country, of increasing State appropriations for public schools.

Many local achievements, such as building halls, making roads, planting trees and vines, establishing libraries, reading-rooms, banks, fire insurance companies, co-operative enterprises, and many other matters of like character, are among the beneficial results of its labors.

To this organization more than to any other source are we indebted for the passage of many just and wholesome laws, such as preventing the renewal of sewing-machine patents, the Oleomargarine law, the restrictions upon transportation companies, the Interstate Commerce law, and the creation of the cabinet position for agriculture. Has had agricultural colleges and experiment stations established, with Farmers' Institutes and the Ballot Reform law in several States. Has had some effect on local and State tax levies. Has somewhat restricted alien landlords and corporations from getting government land. Has educated many of our class to become readers, writers,

speakers and parliamentarians, thus fitting them the better to fill their proper position as citizens of this great Republic.

If the farmers of the United States will consult their best interests, they will flock to the Grange standard in such numbers that our semi-centennial anniversary will bear testimony to still greater achievements, and the complete liberation of the farmers of America from the shackles with which they have so long been bound and the burdens which have become so onerous to them.

The Order is still increasing in our State, three new Granges having been organized, and one dormant one re-organized since last report, with a gratifying increase of membership in most of the others.

Our insurance companies have been continuing their good work, saving large sums to their patrons.

The twenty-fifth annual session of the National Grange was held in Springfield, Ohio, from November 11th to 20th last. The reports from the several States showed a very large increase in membership in several, gratifying increase in most of the others, while a few of the States were just now more particularly booming the Alliance, for political purposes.

Many important measures in the interests of the farmers received attention, and the Legislative Committee are in attendance at the Nation's Capital, seeking to secure the passage by Congress of such laws as we believe will benefit not only the agriculturist, but the country at large.

Farmers of New Jersey, the Order of Patrons of Husbandry is laboring for your good. Will you not one and all lend a helping hand?

Respectfully submitted,

JOHN STATESIR, *Master*.

COLT'S NECK, January 19th, 1892.

THE NINETEENTH ANNUAL MEETING
OF THE
New Jersey State Board of Agriculture,
HELD IN THE
STATE HOUSE, TRENTON, N. J.,
Tuesday, Wednesday and Thursday,
JANUARY 19th, 20th AND 21st, 1892.

MINUTES OF THE NINETEENTH ANNUAL MEETING.

FIRST DAY.

MORNING SESSION.

President Burrough—The hour has arrived for the opening of the annual session of the State Board of Agriculture.

The Secretary will please call the roll of delegates. (See list of delegates, page 7.)

Mr. Dudley—It has been the custom in former years to invite the Governor to attend our sessions, in order that he might participate in the proceedings if he so desired. I therefore move that a committee of three be appointed to wait on His Excellency and invite him to attend our session.

Mr. Ege—Include both houses of the Legislature.

Carried, and the following committee was named by the Chair :
Hon. T. H. Dudley, Hon. Benj. E. Tine and Wm. R. Lippincott.

The order of business, as printed, was adopted.

The reading of the minutes of eighteenth session was dispensed with.

The following committees were appointed by the President :

COMMITTEE ON CREDENTIALS.

E. WILLIAMS.....	Essex.
J. B. FISHER	Hunterdon.
M. D. DICKINSON	Salem.

COMMITTEE ON RESOLUTIONS.

RALPH EGE.....	Mercer.
J. A. McBRIDE	Sussex.
H. V. M. DENNIS	Monmouth.

COMMITTEE ON REPORTS OF OFFICERS.

S. B. KETCHAM.....Mercer.
 T. J. BEANSBurlington.
 W. O. GARRISON.....Cumberland.

COMMITTEE ON COUNTY BOARD REPORTS.

SILAS BETTS.....Camden.
 A. S. APPELGET.....Middlesex.
 S. F. FOWLER.....Monmouth.

LEGISLATIVE COMMITTEE.

Temporary. *Permanent.*

A. S. APPELGET.....Middlesex. Dr. JOS. B. WARD.....Essex.
 I. W. NICHOLSON.....Camden. A. S. APPELGET.....Middlesex.
 D. A. HOPPING.....Morris. CHAS. COLLINS.....Burlington.

STATE PREMIUM COMMITTEE.

THEODORE F. BAKER.....Cumberland.
 ISAAC W. NICHOLSON.....Camden.
 HENRY I. BUDD.....Burlington.

The report of the Executive Committee was read by William R. Lippincott, received and referred to the Committee on Officers' Reports. (See Executive Committee's Report, page 9.)

Mr. Dudley—I have the pleasure of reporting that we have called on the Governor. He accepts the invitation of the Board, and desires me to state that he will be with us at 12:30 to-day, when he will address the Board. We found the Senate had adjourned, but the House of Assembly accepted our invitation.

The report of the committee was accepted.

The Chair—I will call for the report of the Committee on Permanent Legislation.

Mr. Crane reads :

REPORT OF THE CHAIRMAN OF LEGISLATIVE COMMITTEE.

Mr. President and Members of the Board—Your Committee on Legislation of last year met in Trenton the week immediately following the adjournment of the Board and carefully noted all matters referred to them for consideration, and resolved to push the same vigorously as opportunity afforded. In furtherance of this resolve they lost no chance of urging their claims upon the attention of the Legislature ; but their efforts were unavailing, inasmuch as that honorable

body was so thoroughly absorbed in party matters, your committee could not move them.

The very serious subject of equalization of taxation resulted in the appointing of several Tax Commissioners, who have, during the year, investigated the condition of affairs in that department, and will doubtless report the result of their labors, which, it is to be hoped, will bring about a favorable re-adjustment of the same.

By their works will we know them.

Your committee met with Assembly Committee on Agriculture, by invitation, and consented to the modification of the Milk laws. The change proposed in said revision makes it possible for the violator thereof to testify in his own behalf.

A reduction of freight rates was strongly advocated by the farmers of Sussex and Warren, and as strongly opposed by the farmers and milk dealers of South Jersey, while the railroads looked on and laughed. To meet this state of affairs your committee offered House Bill No. 117, which provided for a railroad commission, whose duty it should be to equitably adjust all freight rates throughout the State.

Mr. Appelget labored most zealously in its behalf, but the ill-fated document never saw the light of day after falling into the legislative committee's hands.

Resolutions of the Essex County Board of Agriculture, which were adopted by the State Board, were formulated into Assembly Bill No. 327 and presented to the Legislature, who referred the same to Committee on Corporations. Said committee finally reported it back to that honorable body without recommendation, and after a short debate it was killed. Your committee then conferred with His Excellency the Governor, and requested him to urge upon the Legislature the division of the Tenth Assembly District of Essex county, so that said district might have two representatives in County Board of Freeholders as well as the Legislature, where at present they have but one; said district having a population of nearly 50,000, a large part of whom are farmers, and comprises nearly all the agricultural area of Essex county.

The apparent result of this was a still further discrimination against the farmers of said county by the making of a new district in the city of Newark. Most respectfully submitted,

ISAAC S. CRANE,
Chairman of Committee.

STATE BOARD OF AGRICULTURE.

A. S. Appelget makes additional report :

To the President and Gentlemen—Your permanent Committee on Legislation report that immediately upon their appointment proceeded in the discharge of the duty assigned to them by the numerous resolutions adopted and referred to this committee, only the most important of which will be specially noted in this report. An attempt to do otherwise would consume more time than you would be disposed to devote to such a purpose.

First, we designate those referring to the equalization of taxes. An elaborate bill was prepared under the careful supervision of those well qualified to advise in such matters, and early introduced in the House of Assembly and referred to the appropriate committee. Your committee devoted much time and consideration to this bill, believing that many of its provisions were wise and just, and would have saved the farmers of this State from much of the burden of tax so unjustly laid upon them. No better evidence of this could be offered than the statement that it was most vigorously and persistently attacked by the paid agents of the large moneyed corporations of this State—from the arguments of whom we gathered that their sole idea is that the people of this State were created entirely to afford them a source of revenue and wealth.

The opposition eventually became so bitter that the Legislature was induced to pass a more modified bill, from which much is expected over previous acts upon this subject.

The agitation aroused upon this subject, the exhaustive labors and valuable report of the State Tax Commission, and their eminently wise and sagacious suggestions, all tend to develop a result which will amply repay for all the time, consideration and expense devoted to this matter.

A very considerable attention was devoted to supporting the measure introduced in the House by the Hon. Mr. Tine, of Hunterdon county, to prevent the unjust discriminations in their charges for freight by the common carriers. Realizing the importance of this measure to all the citizens of our state, and the great concern for it manifested for several years past by the State Board, your committee permitted no week of the session to pass without some energetic action in behalf of this measure.

It will be of advantage to you to state that our efforts were greatly nullified by the action of our fellow-agriculturists who had bills on

MINUTES OF ANNUAL MEETING.

similar subjects, but limited to their own locality and interests, which were in turn resisted by yet other farmers who had opposite views, neither willing to yield to others, each insisting upon his own; this gave our enemies the strongest weapon turned against us, for it enabled them to charge we were not a unit upon any measure, which was not true in fact. But so far as we are aware no unbiased citizen of this State ever presented any suggestion against the provisions of House Bill No. 117 or offered a remedy comprising a tithe of its beneficial features.

Your committee believe that by persistence and agitation this bill may yet become a law, it having the support not only of the State Board but also of all our contemporary societies, and many of our most prominent and influential people, including his Excellency the Governor.

It is due to the Hon. B. F. Tine to say that his efforts in your behalf in advocating this important measure merits your most hearty approval.

Mr. Betts—There are some matters the committee have not touched, which claimed a portion of our attention. I refer to the Road laws. Considerable time was given these. Judge Lanning was employed by the committee in making an outline of the plan for legislation to promote better roadways in this State, and he drew up a bill which was discussed for several days, during two or three weeks. The bill was presented for the approval of the Governor, who had appeared before this State Board, and favored the measures for the improvement of the highways of the State. The committee endeavored to incorporate into their bill such plans, suggestions and methods as would meet the approval of the Governor. The bill first drawn was objected to on the ground that it required too large an expenditure by the State, the Governor believing the Legislature would not grant so large an appropriation. There were also some other clauses he objected to. The committee revised the bill, and, with the assistance and by the advice of Judge Lanning, whose judgment was admirable, another bill was drawn up, and we had another interview with the Governor. We tried to incorporate his suggestions, and I believe the bill had his approval. That bill was reported, and I think it passed the Legislature; but another department that had been recommended by the Governor in connection with this bill, which created an officer for the new department, was not approved by the Legislature, and this

defeated the practical operation of the bill. The bill did not concede all the committee desired, but it was an admission, on the part of the Governor, that the State should assist in building its highways. The principle involved therein will, if the farmers of the State continue to insist upon it, ultimately triumph. It is well known that the railroads, the canals, the harbors, and other similar matters, command millions from the National and State treasuries, which have been devoted for purposes of less importance to the people in general than our highways, and for all of which farmers have been taxed. It is a more modern thing that the farmers shall demand a portion of the State taxes to aid in the building and maintenance of these highways, and I think such a law will ultimately be adopted by all the States of the Union. Another bill, the Township Road bill, was amended by the committee and met the approval of the different members of the Legislature, and, through the influence of Mr. Tine, was presented to the Legislature and met the approval of that body. Though the bill which was passed did not incorporate all our ideas as fully as desired, yet it was a step in the right direction. It showed conclusively that intelligent co-operation on the part of this State Board, and of the farmers of the State, properly directed, will secure the attention of the Legislature. I believe in this matter, as in the matter of education, referred to by the Executive Committee—that the education of the teachers who are to teach in the country schools will be exactly as the farmers insist it shall be. If you are content with those who are inadequate to fulfill the business for which schools are established, you will have that kind. If you insist on something higher, and are not content with anything else, you will get it. [Applause.] You must co-operate and unite on plans that are practicable, that command not only the support of intelligent farmers, but of intelligent business men in every walk of life. I want to justify the action of the committee in that respect. I believe the farmers will get everything in reason they demand, provided it be practicable, and if they are united in demanding of the Legislature the future assistance of the State, in road-building, as well as in other matters, they will get it.

Mr. Crane—The reason the committee left the road matter out of the report was because there was a special committee on the road business, and we hardly thought it our duty to report on the matter. We had nothing to do with the formulating of the Road bill.

The reports were received and adopted.

The Chair—We will call for the Secretary's report.

The Secretary then read his annual report. (See report, page 25.)

On motion, received and referred to Committee on Officers' Reports.

FIRST DAY.

AFTERNOON SESSION.

The Chair—I am called upon to explain the absence of our Vice President, and it is with deep regret that I must announce that he lost his wife week before last. He is somewhat prostrated by the shock, and we have a communication stating that he is quite sick, and under a physician's care. We hardly expect him to be present at our sessions, on this account. He expresses his regrets and sends best wishes for the success of our meeting.

Mr. Nicholson—In view of his affliction I move that the President and Secretary of the Board extend to the gentleman our sympathies.

So ordered.

Mr. Williams—The Committee on Credentials report full membership present.

Mr. Matthews—I would ask for information, what privileges, if any, members of the Farmers' Alliance have on the floor of the State Board.

The Secretary—The law states that all members of agricultural or horticultural societies in the State are members of the State Board, and have the right to vote, to discuss points brought up, and to hold office in the Board. If they are a farmers' organization they have the same rights as members of other organizations.

Mr. Matthews—I would like to inquire whether the State Alliance is required to send delegates from its county and State organizations; would they be accepted on the same basis as delegates are accepted from the Grange and from the County Boards of Agriculture?

The Secretary—They are a distinct organization. As the law now stands, if this Board wishes and the Alliance desires to become a member of the Board, it can be admitted by vote of the Board, and will then be entitled to two delegates. To go further than this, there

must be a change in the law. The law provides that agricultural organizations may be voted into membership of this Board, and the law was passed with the object that those who worked for the advancement of agriculture might become members of the State Board, if it was thought desirable. By being voted into membership they would be entitled to two delegates only.

Mr. Ege—Some of us want some light on the Farmer' Alliance before we care to see them admitted to this State Board on the same footing as other farmers' organizations. If they come here asking admittance as farmers, as agriculturists, we say yes, most heartily, but if as a political organization, we say no, most emphatically. I have had some experience with the Alliance in the Western States, and know it to be a political organization there. We do not want them with us as political bodies, but if they come as farmers, admit them by all means.

The Chair—The next business in order will be the appointment of the Nominating Committee, consisting of one member from each county of the State. Nominations will now be made.

The following gentlemen were then nominated as a committee :

W. A. ELVINS.....	Atlantic.
CHARLES COLLINS.....	Burlington.
SILAS BETTS.....	Camden.
Prof. W. O. GARRISON.....	Cumberland.
Dr. J. B. WARD.....	Essex.
T. D. BROWN.	Gloucester.
Hon. B. E. TINE.....	Hunterdon.
RALPH EGE.....	Mercer.
J. M. WHITE.....	Middlesex.
C. D. B. FORMAN.....	Monmouth.
W. F. ELY.....	Morris.
H. C. PERRY.....	Salem.
J. S. HOAGLAND	Somerset.
Hon. A. J. MCBRIDE.....	Sussex.
JOHN CRANE.....	Union.
No Representative.....	Warren.

The Chair—We will now hear the report of the State Premium Committee.

Mr. Baker then read the report. (See page 199.)

The report was received and ordered printed in the annual report.

The President then read his address. (See page 55.)

MINUTES OF ANNUAL MEETING.

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On motion, ordered printed in the annual report.

The Secretary—There is now time for discussion. In former meetings we have lacked time to discuss matters of interest, and we have, therefore, this year endeavored to give members an opportunity to discuss questions of importance, by not crowding the programme. There is now plenty of time for this purpose, and we hope the members will utilize it.

Mr. Betts—I note that ex-Governor Hoard is to address the Board to-morrow morning. I suppose many gentlemen present are aware as well as I am that ex-Governor Hoard is one of the highest authorities on dairy matters in the United States. I heard a gentleman within a week—a gentleman most competent to express himself on the subject—declare that the lecture recently delivered by Mr. Hoard was the best he ever heard on the subject, and I am told he will deliver the same address in this room to-morrow morning. On this account I would like to express my desire that every gentleman who expects to be present to-morrow will bring with him one additional farmer—at least one additional farmer interested in the dairy, so this room will be crowded.

Mr. Appelget—I have read the report from the Sussex County Board, and they speak in the most enthusiastic terms of the lecture delivered by ex-Governor Hoard. I, too, hope the attendance will be a large one, as the lecture will be well worth hearing.

Mr. Blish—I had the pleasure of hearing him before the Connecticut State Board, not only in an address, but in a discussion lasting two hours, and his lecture is most interesting to farmers.

Thomas J. Beans offered the following resolution, which was referred to the Committee on Legislation :

“Resolved, That the New Jersey State Board of Agriculture respectfully request the New Jersey State Legislature to consider the advisability and propriety of placing a memorial of Dr. George H. Cook, late State Geologist, in the Capitol Building of the State he loved and served so well.”

Mr. Beans—Dr. Cook's work for the State began about 1854, serving as Assistant State Geologist. The New Jersey Legislature of 1854 after stating, “Whereas, it is the duty of the State to develop and render available to the fullest extent the facts relative to its great natural resources, as also of its agricultural, mining, mechanical and

other industrial interests," enacted that the survey be completed, and appointed Geo. H. Cook State Geologist. He began his work at once, and with what ability and faithfulness, until his death in 1889, we all know.

His reports are his monuments. Shall we not pause to testify of our respect for the man, of our gratitude for the work he has done for his State? We do honor ourselves if we can sincerely say we appreciate such a life and such a work. It has been thirty years since I have been in personal contact with the civil, social and industrial life of New Jersey, and while very busy with home toil, have watched with much interest those conspicuous and influential in affairs affecting the material interests of the State, and if asked who of all observed seemed during all that period her most useful citizen, would reply, George H. Cook.

I never heard or read his words, or looked upon his face and brow stamped with intellectual ability, integrity and prophecy of conscientious performance of assigned duty, without a deepening of respect. Not only at home but abroad he was "great in mouths of wisest censure." When he visited Europe, the great scientific associations there received him with hearty and respectful welcome; gave him place among their membership, and bestowed upon him their highest honors. But while so many conspicuous in official, scientific and successful business life testify their appreciation of his career and work, there is a more numerous and humbler class whose lives are one long, stern struggle under conditions that are not likely to result in brilliant success; who in the quiet of their homes and in the midst of their daily toil fully recognize their obligation to this citizen who has done more than any other of his time to advance the material interests of New Jersey. With great native capacity and cultured intellect, cordial and courteous in manner, doing with all his might the work he had to do, conscientious and thorough, yet so modest that there was danger that those who usually met him would fail to duly deem him great. Forgetful of self, he devoted all his powers to promoting the welfare of others and the advancement of his State. Who is there that from such contemplation would not choose rather to stand, kindred of purpose, by the side of the clean and useful than upon the giddiest height to which he could be lifted by the hurrahing many? We often hear it said that we have lost him; but we have not lost him. He is still at work in our State, a beneficent

force. Besides his great work in relation to the Geological Survey, Prof. Cook was one of the foremost in organizing the New Jersey Horticultural Society, and to the day of his death one of its most efficient supporters. It has been said of his good work, "not the least was the successful organization and supervision of the Agricultural Experiment Station of New Jersey and this Board with its useful past," its hopeful future. Who did so much as he to start it on its career, to foster and to guide? Until these organizations shall have done all their work for our State and for mankind, his work will not be done, and so cannot be measured.

If this resolution should voice the sentiment of this assembly, and passing on its errand to our Legislature should meet there kindred recognition of its eminent propriety and provoke decree, that in the name of the people on mural tablet, or on canvas or in marble or 'bronze his features be perpetuated and have place among like memorials that give dignity to these stately halls; then when future generations of our useful citizens shall come here and stand reverent and grateful in such presence, they shall seem to hear like a voice, Thus shall it be done to the man whom people delight to honor.

I have endeavored to occupy as little of your valuable time as possible—give a mere enumeration of the lines of his work during all those many long, busy years of public service.

The Secretary—Professor Cook was a member of the Executive Committee of this State Board at the time of his death. He was one of its founders, and its Secretary for several years. I heartily concur in the resolution and hope the object will be attained. I also hope we may be able to have his picture to hang in the office of the State Board.

Mr. Beebe—I can also heartily indorse the sentiments expressed, and hope the request will be granted.

Mr. Blish—I would also like to add a word in behalf of that request. We all knew him well. George H. Cook was one of those retiring men, one of those silent workers. All the people of this association knew him well. He had the good of the farmers at heart. He was bred a farmer's boy, and knew all the duties of a farmer's life as well. He knew the needs of the farmer, and he worked for the interests of the farmer, and worked faithfully and well. No man has ever done more for this State Board of Agriculture, nor for the interests of the farmers of the State of New Jersey,

than he has. I should be very happy to have that resolution have its desired effect.

The Chair—We will hear the report of the Committee on County Board Reports. (See report, page 47.)

On motion, received and ordered printed in annual report.

The Secretary—I move the thanks of the Board be tendered the committee for their interesting, able and comprehensive report.

Carried.

Mr. Betts—Owing to sickness and other causes, I was prevented from acting on the committee. Whatever credit is due for that report belongs to Mr. Appelget.

Mr. Crane—I would like to bring a matter before the Board at this time. The farmers of the State of New Jersey have had one of their most prosperous seasons, and it seems but proper that thanks should be given to the great Giver of all good things. I therefore move you that, beginning with the session to-morrow, the future sessions of this State Board each morning be opened with prayer.

So ordered.

Mr. Ege—We have a report to make in regard to the resolution offered by Mr. Ebert, which is as follows :

“WHEREAS, The postal service is for the whole country, and for all classes of citizens, and the benefits of the system should be apportioned in a manner as nearly uniform as possible to all classes of citizens, regardless of places of residence ; *and, whereas*, the extension of the free delivery service to the rural districts would work a practical revolution in the condition of country life ; therefore,

“*Resolved*, That we are highly in favor of extending free postal delivery in our rural districts wherever practicable, and that we commend the action of our Postmaster-General, John Wanamaker, for his efforts to secure the same, and that our Committee on Legislation urge our Senators and members of Congress to such legislation for the accomplishment of that project.”

Your committee report favorably on this resolution.

Report was concurred in.

Mr. Ege—The resolution offered, indorsed and recommended by the Mercer County Board, is reported favorably. It is as follows :

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"WHEREAS, The present borough tax laws are unequal and unjust, in receiving the road tax levied upon farm lands outside of corporation limits, whose owners are in borough bounds; therefore,

"Resolved, That we petition the State Board to use its influence in behalf of having such inequality remedied.

(Signed)

"S. B. KETCHAM,

"IRA STOUT,

"J. FLEMING."

Report was concurred in.

Mr. Ege—The resolution offered by the Atlantic County Board of Agriculture is also reported favorably. It is as follows:

"Resolved, That the Game laws be amended to the effect that the killing of quail be entirely prohibited. Experience in many countries has proven that they are of the greatest assistance to farmers in destroying countless numbers of injurious insects and the seeds of noxious weeds."

Report was concurred in.

Adjourned till 7:30 P. M.

FIRST DAY.

EVENING SESSION.

The Chair, on motion of Mr. Budd, appointed a committee to report on the exhibits of fruit, vegetables and appliances on the tables.

Committee—Messrs. Henry I. Budd, V. P. Hoffman and E. P. Beebe.

Mr. Crane offered the following resolution:

"WHEREAS, The Trespass laws of the State are not well understood by the farmers of the State; therefore, be it

"Resolved, That the Secretary of this State Board be instructed to have prepared by some competent legal authority a guide of procedure in cases of trespass, and have the same, as well as the laws on the subject, printed in the annual report of the Board."

I think the cost would not be much, and as the matter is not generally understood by farmers it would be a valuable thing to them.

On motion, the resolution was adopted without reference, and referred to the Secretary for action.

The Chair—I took occasion to look up this Trespass law more than a year ago ; I found that, while we had a law which was known to lawyers and to committing magistrates, to the majority of farmers it was unknown, and they were at a loss to find where the law was. The old law of 1857 is the only general law we have on this subject, and the Trespass laws are sandwiched in with other laws. We should have a satisfactory Trespass law if the present laws are not satisfactory. I have alluded to it again this year, and I mentioned, in case the mounted letter-carriers are established, they should have authority to act as Constables, so that farmers can have some one to call on in helping them to execute these laws. I think it is a matter requiring considerable attention.

The evening session was devoted to addresses on ornithology, mammalogy and bird migration, by Dr. C. Hart Merriam, Chief of the Division, and Professor Barrows. (See page 145.) Hon. Jas. Buchanan, M.C., also made a short address. (See page 165.)

At the close of Mr. Buchanan's remarks the Secretary moved that the President be given authority to select a committee, to-morrow morning, to bring in a resolution, or something of that nature, with reference to free mail delivery, the adulteration of food products, gambling in futures, and to the proposed legislation in regard to irrigation referred to by Mr. Buchanan, and that these resolutions be sent to our Senators and Representatives at Washington.

So ordered.

SECOND DAY.

MORNING SESSION.

The Chair—The Board will please come to order. I will call on Mr. Crane to offer prayer.

Prof. Garrison—A very good suggestion was made by the President yesterday, and no action has yet been taken. I refer to the introduction of the study of agriculture in our common schools. He also asked that the Executive Committee look after some suitable book for introduction as a text-book in country schools, for the study of agriculture. I have had some little experience in common-school work

myself and am thoroughly convinced it is possible and practicable to introduce the primary principles of agriculture in country schools. I think no further legislation is needed, and I therefore move that this State Board of Agriculture recommend each County Board to use their utmost endeavors and influence with the Trustees of the rural districts to have the teaching of the principles of agriculture added to the curriculum of their schools. I would like to say further that there is already published a book which is very suitable. A teacher of average ability, with such a book, can readily master the principles of agriculture with very little outside study. I have no interest in the book, whatever, either as agent or author, nor am I a publisher. It is a book only recently published,—published at the request of certain boards of agriculture, by the American Book Company, and entitled "Principles of Agriculture." It is a very small work, but it contains a great deal of the kernel or substance of the subject.

Mr. Dudley—This, in my judgment, is a very important subject. We have agricultural colleges all over the country, and they do a great deal of good, but there is just this one defect about them, or, at least, if not a defect it is a failing—they do not educate farmers.

Recently, in visiting the Agricultural College, I was introduced to a student who said he was going to be a practical farmer. This is an exception; our agricultural colleges, as a rule, do not turn out practical farmers. I congratulated the young man, for he was the first I had ever found who intended to be a farmer. As a rule, these agricultural colleges are educating young men for civil engineers or some other of the learned professions rather than agriculture. It is a defect in the educational departments of our government that there is not some way adopted by which the farmers can be educated. I can see no better way of reaching this result than by introducing some practical book upon farming into our common schools, where farmers generally are educated. I know some farmers are educated in the higher schools, but many of them, unfortunately, never go beyond the common schools. It would be of vast benefit to the farmers' children who are being educated in our common schools. If there is no suitable book in existence, one could be prepared without much difficulty and be introduced for use as a text-book. Farmers' boys could then be taught not only mathematics, geography, &c., but they could also receive some practical instructions on farming, because farming is a science to-day. It won't do to say "my father sowed his wheat and

planted his corn in such and such a way." We have got beyond that, and something more is wanted to make farming lucrative. It is now considered absolutely necessary that girls be taught something more than the rudiments of learning to make them good wives and housekeepers, for a knowledge of the duties of housekeeping is of fully as much importance as a knowledge of mathematics and the other branches. In the Philadelphia Normal School it is now thought wise to teach cooking, and they have a regular cooking class; sewing is also taught to advantage, and other things, practical and useful, are taught—things most beneficial to society. Good results are coming from this extended instruction to girls, and equally good results would follow a proper course of instruction on farming, in the elementary parts at least.

The Chair—I will say, in explanation of the suggestion made yesterday, we do not believe it is necessary to incur expenses amounting to thousands of dollars for the introduction of the study of agriculture in our country schools, but, in talking with school authorities, we have been convinced that we must lay some foundation. The first thing is to get the teachers in line to instruct the young men in the agricultural principles. To do this we want, at least, an agricultural primer. Such being the case we have made some little search, and it is not at all improbable that a book can be found. If it cannot be found, I take the liberty of asking why we cannot make one, through the assistance of the Board of Education. I am informed the matter is practicable and can be accomplished. Possibly the book Professor Garrison mentions may be the one we had reference to, but I think it is a Canadian publication, not applying to our schools as well as it might. I make this explanation to show why I called attention to this subject.

Mr. Betts—I have had some experience in this matter and think it a very important one, and one that should meet with the support of every farmer. I think we overestimate the absence of a text-book. If the educational authorities of this State should take such action as to require a certain amount of time to be devoted to the elementary principles of agriculture in our schools, the teachers who are competent—and many of them are competent—would find means of introducing the study without regard to a text-book. Prof. Agassiz said that the best teachers seldom used text-books. The best method of teaching is by topic, and the way to teach agriculture is by topical

exercises. If half an hour were devoted to this study each day in the common schools, treating of the elementary principles of agriculture, and the teacher required to devote that amount of time to the whole school, then the teacher would prepare himself or herself previously, through books or by conversation with intelligent men, and this topic could be introduced the next day for consideration by the school. The day subsequent a review could be had, and on every alternate day a new subject could be introduced, to be reviewed the following day. In a little while the children would go home and talk with their parents, and would interest them, and the interest would grow. Everything depends, not upon the book, but upon the teacher. Back of that, however, the fault lies with the farmers themselves, in that they have not considered such knowledge necessary. When the public sentiment of the community is educated up to the fact that education is necessary to successful agriculture, and the farmers demand it, there will be no trouble about books. There are now many books which teachers can consult as reference-books, and reference-books are more valuable to the best teachers than the text-book. The text-book is generally an incidental affair in the hands of the best teachers. I believe we can introduce agriculture in our public schools by creating a sentiment through conventions of farmers, impressing the authorities that some time should be devoted to it in our public schools. The text-books will multiply rapidly in a short time, and we may even have too many of them.

Mr. McBride—I would like to throw out this suggestion. While it may be all right to introduce the study of agriculture in the common schools, it is also but fair to say that the farmers themselves should have enough common sense to teach their boys the rudiments of agriculture themselves, without the necessity of purchasing a multitude of text-books.

Mr. Garrison—There are a number of gentlemen here who are competent to teach their children mathematics and the higher branches, but they send their boys to school, for they have not the time to devote to their instruction themselves. This is better done in the school-room, which is intended for that purpose. Others are not competent to teach either the mathematics or the principles of agriculture. With all due respect to the average farmers of the State of New Jersey—an intelligent class, I think it is but proper to say—the majority cannot teach the elements of agriculture. As to home

instruction on farming, most boys get more than they want. It is necessary that some instruction should be given on this subject. Much of the money wasted in feeding stock could be saved if a proper understanding of the food values were had, and the amount thus wasted would be enough to stagger one, could it be known just what it is. Introduce such studies in the schools, and the home will become the center for the dissemination of this knowledge to the older people.

Mr. Appelget—There is one thing I think we should dwell upon in this connection. A celebrated English chemist was asked for some valuable information, of use to farmers. He told them he could not aid them at all, but he said "if you will study some of the theories I will advance you will be saved both time and money pursuing useless experiments." If you give your children the primary principles of chemistry, instead of following a thousand and one things, spending your money on this compound and on that compound, worse than useless, you will get straight down to business. My father brought me up to work on the farm, and I struggled along, but I learned more in a half a dozen lessons from Prof. Voorhees than from everything else. I could go straight at the basis the Professor laid down. I knew about what the elements were and I got right at it. I think it is a very important matter, and I heartily concur in the remarks of Prof. Garrison.

Ex-Governor Hoard—This is a very interesting topic, and I would gladly leave the cows to discuss this question. I wish it could be discussed by every farmer in the Union. The farmers of this country have only one school. There is just one school they are responsible for, and that is the country district school. All other schools are practically out of their hands; and whatever the country district school is, the farmer is likely to be just the same. It is one of the most faithful mirrors on earth to reflect its environments. It would have been a wonderful assistance to me, as a boy, if I could have gotten hold of some simple text-book explaining the meaning of nitrogen and of phosphoric acid and potash as manurial agents in agriculture. I would not then have been compelled to grope in the dark. We need a clear and intelligent idea of the relation of nitrogen to growth and fertility. It seems to me some simple little text-book should be introduced into our schools, that the farmers' boys may get an intellectualized idea from the start. We have a surfeit of hard work on the farm, and the reason the boy wants to leave the

farm is because there is nothing intellectual about it. There is nothing to satisfy the cravings and hungerings of his mind, and he sees nothing in it but drudgery and slavery. Let the vista of successful agriculture be opened to him. It is the deepest and most profound theater for the exercise of his intellect he can find on earth. Broaden his mind and show him what is true farming, and this will do more good than all the theorizing we have expended on it. I want to see the farmer of these United States have some sort of respect for his own calling. [Applause.] Therein lies the trouble. He has no respect for farming as a business, and he slaves and saves, as no man should, in order to make a lawyer out of his son, and God knows there is a surfeit of lawyers. [Applause and laughter.] The lawyers admit themselves that there are too many of them. Thousands of good farmers are spoiled to make poor lawyers. The farmer will starve himself, almost, and immolate himself on the altar of his son's advancement, to make a poor lawyer or a doctor, but who ever heard of a farmer slaving or saving to educate his boy to become a farmer? [Applause.] Is it not time to see that this grand science, the embodiment of all sciences, is advanced as it should be, even if some sacrifices are necessary? [Applause.] When you look at it squarely and strongly it comes right down to this, that we need to respect ourselves and our calling. [Applause.]

The motion was then adopted.

Mr. Appelget—Incidental to the matter discussed, I have been requested to offer the following resolution in relation to high prices of school-books :

"Resolved, That we request the State Board of Education to devise a remedy to relieve us from the extortionate charges for common-school books supplied to our public schools."

On motion, referred to the Committee on Resolutions.

Mr. Appelget—In this connection I would like to state that the price now charged for these school-books, used in our common schools, is simply fabulous. Many of these books, under other covers and other names, could be bought for 5 or 10 cents each, while the charges made for them by the publishers is probably a dollar or more. This comes especially hard on the poor man. The diversity of text-books also causes a hardship, for instance, to the tenant farmer, who may live in one district this term and in another district next term,

and may thus be compelled to buy an entire new set of books for his children. Text-books should be uniform throughout the State. This is the cry heard on all hands. It comes hard on the man who is struggling to educate his children. A laboring man with four or five children can ill afford this expense each year. I think something should be done by this State Board.

The Chair—According to a resolution of last evening, the Chair was to appoint a committee to formulate a set of resolutions in regard to the matter of adulteration of food products and other matters mentioned by the Hon. Mr. Buchanan. I will name on that committee the following gentlemen :

J. B. ROE.....	Gloucester.
SILAS BETTS.....	Camden.
W. O. GARRISON.....	Cumberland.
W. R. WARD.....	Essex.
CHAS. COLLINS.....	Burlington.

The Chair—We have with us ex-Governor Hoard, of Wisconsin, who will now address the Board on "The Dairy Temperament of Cattle."

I take great pleasure in introducing Governor Hoard to the Board. (See page 71.)

At the close of Governor Hoard's address, adjourned to 2 P. M.

SECOND DAY.

AFTERNOON SESSION.

The Chair—If there are any resolutions to offer we will hear them now.

Mr. Nicholson—I move that the Executive Committee of this Board have printed for distribution a number of copies, as many as they deem necessary, of the address of Governor Hoard delivered before this meeting.

So ordered.

Mr. Ege—Your committee report favorably on the following :

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“Resolved, By the Burlington County Board of Agriculture, in regular meeting assembled, that we petition the incoming Legislature for State aid in constructing the roads of the State.”

We have stricken out the word “leading,” as applying to the roads, making it read as I have given it.

The report of the committee was concurred in.

Mr. Ege—Your committee report the following back to the Board, without action or recommendation :

“Resolved, That our Legislative Committee be and they hereby are instructed to use their best efforts to have the money annually appropriated to have the laws printed in the newspapers, appropriated for the purpose of improving the public roads of the State.”

Judge Forsythe—I offered that resolution in good faith and move its adoption.

Motion seconded.

Judge Forsythe—There is a strong sentiment and feeling in our county in favor of the improvement of the public roads ; to improve these roads, as you are well aware, will entail a heavy expense on the taxpayers of the State. My attention has, for a long time past, been called to the uselessness of expending this large amount of money, said to amount to about \$100,000 per year, for publishing the laws in the newspapers of the State. It does no good at all ; they are printed in such fine type that very few people read them, and those who wish to read the laws passed by the Legislature prefer, under all circumstances, to get a copy of the pamphlet laws, which are indexed, and in which they can find any special act which may have been passed by the Legislature. We all feel the burden of taxation very heavily, especially the farmers of the State—the heavy burden of taxation resting on the land we cultivate. We all know the heavy burden it causes us. The question is, will we take action ourselves to lighten these burdens ? I know those who occupy the chambers down stairs will touch this matter very gingerly, and in a very delicate manner. For them to get up and advocate the taking away of this plum from the newspapers of the State is for them to incur the enmity of every newspaper in every district in the State in which a member of the Legislature may be a candidate for election next year. Very few members will have the temerity to agitate this matter, and they won't do it unless they are backed up by the farmers

and the people of the State. If we want them to do anything for us we are the men who must have the courage of our convictions, and say to these members, "We want you to do this, and demand that you, as our representatives, take our part in this matter. Will you do it, or will you prove false to our interests? It is for you to say." The best thing taxpayers can have is good roads, and to have good roads you must have money. To get this you can save \$100,000 of unnecessary expense to the State, and that money appropriated to roads, in addition to what may be appropriated by counties and townships, will, in a few years, give us what we ask for. Will you take the responsibility of demanding this from our representatives, and tell them you will stand by them if they will support you in this matter?

If they go ahead, and push this through without regard to the papers, you must stand by them. Tell the newspapers you are working for your own interests in this matter, and that if they fight you, you will fight them—that if their papers fight this matter you will no longer help support them. We must help pay the bills, and should have something to say as to what this money shall be expended for. [Applause.] These pamphlet laws are accessible to all; they can be found in your County Clerk's offices in every county in the State, and you can get them without a cent's worth of expense. I find a copy of these laws very necessary, and every intelligent individual should know of the laws he lives under, and should keep a copy of them at hand at all times. It is your duty to do so. For the interest of good government, and of good roads, and to prevent extravagance in the State, abolish this system of advertising the laws, and appropriate the money to better purposes.

The motion to adopt the resolution as read was concurred in.

The Chair—The next business on our programme will be an address on "The Production of Beef, Mutton and Pork in New Jersey for a Market. Does it pay?" By Hon. John Taylor, of Trenton, N. J. (See address, page 99.)

Professor Garrison—Your Committee on Officers' Reports would report as follows:

REPORT OF COMMITTEE ON OFFICERS' REPORTS.

Your Committee on Reports of Officers have carefully examined the same submitted to them, and report: 1st. We commend the

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officers for the able reports presented and for their great interest in the cause of agriculture as evinced by their labors. Our State Board is to be congratulated in having such able and efficient officers. 2d. We desire to call to the careful consideration of the Board the following recommendations taken from the various reports:

a. That an effort be made through our Legislative Committee to have the World's Fair appropriation made large enough to insure a creditable showing for the agricultural products of the State, and through Local County Boards to have the farmers interested in sending their best products for exhibition.

b. That the subject of steam plowing, to which our attention has been called by the President, is worthy of further consideration.

c. That the suggestion made by His Excellency the Governor that some tribunal be interposed between the producer and the common carrier should have further consideration, and our Legislative Committee look into the advisability of adding these duties to the Board, if not in conflict with their established duties.

Many other subjects, such as taxation, improved roads, food adulteration, free mail delivery, the introduction of the principles of agriculture in rural schools, &c., have already been acted on by this Board.

The committee would respectfully call attention to the fact that it is difficult for our Secretary to make a worthy report on the condition of agriculture of our State with its twenty-one counties, when only ten furnish him with reports.

We heartily commend the various reports to the careful study of our members.

Respectfully submitted,

W. O. GARRISON,

THOS. J. BEANS,

SAML. B. KETCHAM.

On motion, the report of the Committee was concurred in.

The Committee on Nomination of Officers for Ensuing Year then reported as follows: (For President, &c., see list of officers, page 5.)

The gentlemen put in nomination by the committee were unanimously elected.

The Chair—I deem it but courtesy to the Board to acknowledge the compliment and the honor conferred by your Nomination Com-

mittee and by the concurrence of the Board in their report in again placing me in this honorable position. I can assure you the labors of your President are not always confined to the duties of the chair, and, in the six years I have held this position, it has been my endeavor to fulfill the duties outside of the chair to the best of my ability, and I have given considerable time and attention to other matters. At times the labors seem arduous, as the duties are constantly increasing and the correspondence growing larger and more important. I therefore enter upon the duties of the next year with a full knowledge of the work before me. I appreciate in the highest degree the compliment paid me and the manner in which I have been sustained in what I have done. You can confer no higher honor on a farmer than this you have conferred on me.

It would not be right if I did not say a word on behalf of the gentlemen composing your Executive Committee. These gentlemen have worked most earnestly in your behalf and most faithfully, and that they will continue to do so in the future I have no doubt.

On behalf of Mr. Bacon, I would state that he is ill and unable to be with us, but I have a letter from him expressing hopes for the success of the Board. Mr. Lippincott has been called home by a telegram stating that his wife is ill, so that he is not here to speak for himself. I can say with authority that he greatly appreciates your support, and I know you will have the benefit of his best efforts and knowledge, although it has taken much of his time and attention.

Professor Voorhees has been called home by his class duties, but desires to be represented as saying he greatly appreciates the honor conferred on him. In retaining the Professor you have made no mistake; he is almost a necessity in the Executive Committee, as he is always willing to impart any information, whether scientific or common, and is ready to aid us in every way in his power.

The other gentlemen are here and will speak for themselves.

I again heartily thank you for the evidence you have given of your good will. I can promise no more for the future than has been done in the past, but, if health will permit, will try to render the same service in the year before us. [Applause.]

The Secretary—The Chairman has referred to the "other members" being present to speak for themselves. I can only say for myself that, being the off-horse in the team, I will try to keep my side of the swingletree to its place. [Applause.]

Mr. Beebe—I offer the following, and move its adoption without reference :

“Resolved, That the State Board of Agriculture recommend the Golden Rod as the national flower.”

Carried.

Mr. Ege—I move that the President's address, the Executive Committee's report, the Secretary's report and the report of the Committee on County Board Reports be printed in pamphlet form, to be ready for use before this session of the Legislature closes.

Carried.

Mr. Lippincott—I move that we suspend the rules to permit Dr. Parry to deliver his address now, instead of this evening.

The Chair—There being no objection, Dr. Parry will now speak on the

ORIGIN, STATUS AND PROSPECTS OF THE NEW JERSEY DAIRYMEN'S PROTECTIVE ASSOCIATION.

When and where the idea first developed of organization among the milk-shippers of the Philadelphia market it is difficult to state, for there have been some associations in Pennsylvania, one at least has been in successful operation for some years past, and the community generally, except farmers, seems imbued with the idea of organization. In fact, association is and has been the panacea for all individual oppression and injury that cannot be successfully resisted. Almost all business, except farming, has found it necessary to combine in some way to afford protection and security.

How far these sentiments and facts have influenced us we cannot say. But the origin of the New Jersey Dairymen's Protective Association is closely associated with the reduction made in the price of milk by the dealers at the Camden platform one year ago this month, when they made the price three and a half cents. This half-cent reduction made it apparent to the farmers that the dealers meant to encroach on the already narrow margin of profit to a limit, if this was not the extreme limit, that meant to many farmers who were largely dependent on the income from this business, a condition but little short of bankruptcy.

In fact, the requirements of the dealers—and these were the so-called

good and responsible dealers—were to make good, rich $12\frac{1}{2}$ per cent. solids milk for a price that would not pay for the hay and such feeds as cotton-seed meal, corn meal, brewers' grains, bran, &c., at the prevailing prices, and without these the milk could not be produced. As each individual knew he was powerless, the idea of organization began to be talked over, and it seemed to offer the only relief for our helpless condition in this matter of business.

In giving our plan of organization I must ask you to remember that we are young in association work, as well as pioneers in this part of the country in the field of endeavoring to control the market price of the commodity which we sell.

We have found many of our farmers as conservative in this direction as most dealers are antagonistic to every move toward it, so we have had to go into a field for recruits where not only the natural fear of the individual held sway, but where the persuasion or threat of the dealer was readily listened to, and sometimes heeded. But we have laid down several propositions which we will endeavor to solve to the general betterment of the dairy business in this section of the country. The first one is that we will name the minimum price for which our members will sell milk delivered at Philadelphia or Camden, and the terms and conditions on which it shall be sold. This does not seem a very serious proposition to make from a manufacturer's standpoint, for we must consider milk as a manufactured article, and in this light we would say that the cost would regulate the selling price.

I will ask you for a moment to consider the farmer as a business man; look over his farm, stock and way of working, rising early, toiling industriously, and attending to the affairs of the farm promptly with the great majority of us. In fact, a farmer must be early and prompt in these days to keep his farm, for the farm won't keep a sluggard. How has he done with this part of his business? He has risen early to get his milk ready for shipment, and when he has delivered it at the station he has simply let it go, for from this time on it has been an entire neglect of business. I am not here to charge the dealers with anything in reference to their management of this business, for it seems to me they have done fairly well with their opportunities, and perhaps have used some of those neglected by the farmers. But I am here to charge the farmers with malfeasance in office, or business, by neglect. Some of the dealers have done in the past all

that will be required of them in the future, but what the few have done is evidence of how all should be treated, as the welfare of the many is the object of the association.

We became an incorporated body about October 1st, 1891, having then a membership of about three hundred, composed of local associations in the different milk-shipping sections of South Jersey. Our business is transacted by and through a Board of Directors, each local association having a director, the representation being one director to every twenty members. The directors meet on the last Saturday of every month to transact the business of the association, and with the directors of similar associations in Pennsylvania fix the price of milk for the ensuing month.

Now, I would ask you, gentlemen, are we requiring too much when we say we will name the price of this staple commodity of our markets, the quality of which we regulate by law? And are we asserting too much when we say we are worthy of being trusted as to not naming an unreasonable price? Are we demanding more than we should when we say that when you receive this perishable article from us in good condition you shall not return it to us sour after you have tried and failed to sell it? The losses from this cause have been considerable. Even in this past year of scarcity of milk there has been eight thousand dollars' worth of milk returned from the Camden depot as sour. This is rated at four cents per quart, of which one cent is for freight to and from the city. We do not claim this is all the dealers' fault, but we do know that when milk is scarce we have but little sour milk. But let it become plenty and we find it won't keep sweet. Our next proposition is, that when a dealer wants to purchase milk on credit he must give security for the payment of the bill when due, unless he is of sufficient business standing to insure payment. The amount of money lost in this way seems foolishly large, but farmers have been willing to trust almost any one in the past; hence this rule to stop giving away milk, which we believe will benefit the dealer who has been robbed of his trade, as well as protect the farmer from the ravages of such wayfarers. Thus, you see, we become in a measure an insurance society to those who come in with us and obey the rules, and furnish milk of the right quality and in good condition.

To secure this we have now a membership of nearly four hundred milk-shippers, working in conjunction with about one thousand or

more in Pennsylvania, who are bound to the association with its rules and penalties, accepting in return its profits, security and benefits, managed by a Board of Directors, who are endeavoring to solve the problem for which they were selected to the best of their ability, and for the mutual benefit of all concerned. And we believe our farmers are determined to work this out, satisfied that the time has passed for saying we cannot help ourselves, but believe that, by action, we can do that which it is our privilege and duty to do if we will. And we will remind ourselves in every locality that he who helps his neighbor protects the community, that he who protects the community defends himself and his household.

We propose to start a creamery at Camden to take care of our surplus milk, owned and operated by the association, believing this to be a safe way to protect ourselves as well as the dealer from an overstocked market. In conclusion, I ask of you, gentlemen, that you consider our propositions, and if you find them wise and just, take them home with you and urge them on your neighbors who may not have joined in the work of the association, for this should be a popular move, as its benefits will be to the entire populace, and will be in accordance with the nearness to an entire unity of action we are able to achieve in securing every shipper as a member and every farmer as a co-worker and interested friend. We are satisfied that the future of all farm business depends much more upon concerted business action of our farmers to avail themselves of the best conditions of the market rather than neglecting to pay any heed to the requirements of the market, and when losses occur spend our time in going up and down mourning our losses, bewailing the misfortunes of our neighbors, and crying hard times. I am well satisfied that much of the hard times of farmers is preventible by more attention to the business of the farm, and I hope our association will be able to do its part in developing the business sagacity off the farm that is generally apparent in the work on the farm.

A vote of thanks was extended Dr. Parry for his paper.

Mr. McBride—How many have you in your association?

Dr. Parry—We have about four hundred members—four-fifths of all those shipping to Camden; there is another association at Third and Berks streets, Philadelphia, where they have about seven hundred members; there is another at Ninth and Thompson, and at the

Baltimore and Ohio, at Twenty-fourth and Chestnut streets. There is an agent of the association on every milk platform where milk is received. Our association is the second largest, that at Third and Berks streets being the largest. Together we control two-thirds of all the milk shipped to Philadelphia and Camden. So far as the New Jersey association is concerned, we agree to take care of all milk shipped, and to do this we propose to establish a creamery as near the Camden platform as possible, where we can use any surplus milk we may have on hand. The dealers say we can't take care of the surplus milk—even those who desire our success say this, but we propose establishing a creamery for this purpose. The cry in regard to the cost of milk is that it cannot be sold at the advanced price. I asked a large dealer from Third and Berks, who had some trouble there, if he thought they would sell any more milk at 6 cents than at 8 cents, and he said he thought not—that the consumption would be about the same. There is no need to sell milk at 6 cents in May. We will ship all the milk of our members, and the overplus, if any, will be divided to each one. The dealers say we can't control it, but we have done so. The association must stand, if the farmers expect to make a profit from the milk business. The trouble has been that the dealers have bought immense quantities of skim milk for the purpose of diluting their whole milk, and for this reason there is a surplus of whole milk. This is not due to production so much as the dilution with skim milk or separator milk, which they can buy so much cheaper. Milk was scarce all last year, and the dealers laughed at us when we took up the fight in Camden in December. The dealers thought they could get all the milk they wanted, and they hunted all over for it; the large dealers were even hunting during January for milk, and yet they kept saying that milk was so plenty they could buy all they wanted for $3\frac{1}{2}$ cents. They told us if we would not take that they would drop us; people thought we farmers would be ruined right away if they dropped us, but we guaranteed ever shipper equal privileges, provided he shipped a good quality of milk; we became insurance agents for taking care of their milk, and we also take bonds from those dealers who are not considered financially responsible. In regard to returning milk sour, this used to be done sometimes after they had kept it two or three days, but this cannot be done now. The association is now receiving $4\frac{1}{2}$ cents for its milk, and we believe we will succeed.

Mr. McBride—Do I understand that you are receiving $4\frac{1}{2}$ cents for your milk delivered—does that price include the freight?

Dr. Parry—We pay the freight, and this gives us 4 cents net.

Mr. McBride—What is your freight rate?

Dr. Parry—One-half cent per quart.

Mr. McBride—That is, 20 cents per can; now, in case the dealers refuse to pay this price, what is the plan of procedure you have adopted?

Dr. Parry—At the Camden platform Gravenstine refused about 1,000 quarts, but we have had no difficulty in placing it. Our fight is over, and our dairies are all placed. At North Penn the association is taking care of its members; a few large wholesale dealers comprise the opposition. At North Penn they refuse to pay the $4\frac{1}{2}$ cents for December. Our forty-quart cans measure out about 46 quarts as sold by the dealers.

Mr. McBride—You ship in forty-quart cans.

Dr. Parry—We ship in twenty and forty-quart cans. Our system is this: The railroads sell us tickets, which we tie to the cans; these tickets cost ten cents each, and one ticket carries a twenty-quart, and two are required for a forty-quart can.

I hope my remarks will aid in working out our ends. It is a popular move both here and in Pennsylvania, and we claim that it is to the interest of the entire community that this business shall be done on business principles. Farmers should be upheld in what they are doing. There are only a few conservative men holding back now, but it is no time for conservatism, for the dealers will use every effort to break us down. Consider this carefully, and if you know of any one who does not belong, urge them to come in and do their part in this fight; no man need have any fear. I believe there are enough members in this association to-day, if necessity demand it, to give Philadelphia almost a blizzard. We could shut off two-thirds of the milk-supply of the city of Philadelphia at five days' notice.

Mr. Goble—I would like to warn the gentleman who has just spoken not to get the price too high, or the dairymen from Northern New Jersey may be tempted to ship their milk down this way; it might be quite a temptation to us to do so.

Dr. Parry—What are the gentlemen getting in the upper part of the State?

Mr. Goble—Four cents.

Mr. Crane—That is, four cents for forty-six to forty-eight quarts, but we do business on a different principle. We use liquid measure, and get paid for forty quarts liquid measure, and no more. Last winter we had a bill before the House, and the South Jersey farmers, headed by Mr. Abbott, came here and knocked it out. I think this was unwise. We will never accomplish anything until we act on business principles. In regard to the surplus milk, I think we should establish creameries to work this up; many of the most successful dealers in New York own creameries, and they send only as many cans to the city as their trade demands, and the surplus is worked up. Why can't the farmers pattern after these men? They have grown rich at it, and if farmers wish to make any money, they should go about it in the same business-like way.

Mr. Lippincott—I do not see that there is much difference in the prices of milk in North and in South Jersey. Taking the difference in measures the prices average about the same, for the same quantity of milk.

Dr. Parry—In our case the surplus will be worked up by the creamery which we propose to establish in Camden, as near the milk platform as possible. The North Penn men are shipping the surplus back to Humeville, where it is made up for them for five cents per pound. We had better throw the milk away than give in; they ask what we are going to do with the surplus, and I say throw it away or give it away, if necessary. Some of the farmers are so much afraid, and go on the old law that competition is the life of trade. That is true—it is the life of the dealer and the death of the farmer. [Applause.]

We want you to think of these things; use intelligent business rules; we can come together in these matters; we ought to be able to stand alongside any men and do business. If the farmer don't take care of himself no one else will ever take care of him, that is sure. [Applause.]

Mr. Lippincott—We have some very peculiar men shipping milk to Philadelphia; when the Gravenstines held out in December and would not pay our prices, plenty of them sent their milk right on at 4 cents, while their neighbors got $4\frac{1}{2}$ cents. The Gravenstines promised to give them $4\frac{1}{2}$ cents in January, because these farmers "had stood by them." Now, every one with a knowledge of figures knows that if you get but 3 cents per quart, or \$3 for 100 quarts, at 4 cents

you need ship but 80 quarts to get \$3.20, and then you make 20 cents, besides saving the freight on 20 quarts of milk; so it would be cheaper to throw the 20 quarts away than send it at the old price.

There is no danger of getting prices too high. I think the farmers in the association know enough about the milk business not to get the prices too high—so high as to draw the milk away from the creameries and into the market. These creameries run by private individuals have a bad effect on the market; when milk is scarce they send all their skim milk to Philadelphia, where it is bought by the dealers and mixed with the whole milk, and sold as whole milk. When milk is scarce this is done right along to give them a sufficient quantity of milk, and to break the farmer down, and keep prices down. I have known instances where the dealers have had their shippers hold back milk, and at the same time they were getting skim milk from the creamery, to make farmers believe that milk was plenty. This is often done.

Mr. Crane—I deem this a very important question, not only to those shipping milk to Philadelphia from the southern portion of the State, but to those in the northern portion of the State also. If this association can be sustained, and they can demonstrate they can control their business and name reasonable prices, there is no reason why the shippers to New York cannot do the same. If it can be done with the milk product, there is no reason why the farmers of the whole state cannot do it on the other products. Farmers have always stood by and let others name their prices for them—name the prices on what the farmer manufactures, and when he buys anything the price is named to him also. The question is a very important one, and one that should receive the support of all the members of this State Board.

Mr. McBride—Without entering into any discussion whatever, I would like to ask my friend, the Doctor, whose idea of the milk business and whose idea of the rights of the farmer is irrefutable, why it was, as I understood, that when the farmers of South Jersey were shipping their milk over the railroads for twenty cents per can, they were almost universally opposed to the farmers of the upper portion of the State, in their request looking to the proper reduction of freights on milk, as a matter of protection to themselves?

Mr. Lippincott—It was to keep your people from flooding Philadelphia and Camden with your milk from the northern part of the State.

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Mr. McBride—If that spirit of selfishness exists, if it is right that when we come before the Legislature and ask simply for what is our right, for a measure which did not interfere with your prices whatever—not in the slightest—when we did not intend to interfere with the prices of the Philadelphia markets, then we say to you we reserve the right to return the compliment. For it is a known fact that but for the interference of the farmers of that section, the Milk bill would have been passed.

Dr. Parry—I do not apprehend that those who ship milk into Philadelphia would be afraid of the individual farmers shipping milk from the upper part of the State. When this milk contest came on, the farmers shipping milk around New York City were in a fight with their own creameries—these men were the element in the strife. Without them there never would have been any fight. The only thing is that it will cause the dealers a little more trouble to help each other. They can't go from Philadelphia to New York, or from New York to Philadelphia, without an additional price upon it. This puts it above the price of our milk. We can already produce more than Philadelphia wants, and do not want milk sent here from other parts of the State. We do not want to have milk shipped here from New York when milk is scarce here, nor do we want our dealers to have the privilege of shipping to New York when milk is scarce there. In the hands of the dealers I can see an element of danger that might be serious in its effects. We know the dealers do this, and we would like you to hold this thing in abeyance another year; by the month of May they will accumulate every quart they can, and down will go the price, if they can bring it about; then we may be compelled to keep back all our milk, and they will supply themselves from other points, and we may be compelled to hold our milk until they get through with the milk from long shipments, and find it not satisfactory. With the present rates your dealers could not help them out from a long distance at the same cost as ours. They are helping them out at North Penn now, but if it can come from Jersey City for the same price it will make a very serious disturbance in the milk trade.

Mr. McBride—The gentleman agrees with me exactly. This is just what we object to, and what we are in favor of is that the milk which is near the cities shall have the preference over the milk which comes hundreds and hundreds of miles to New York. That was just

what the farmers in the upper part of the State were working for. I say that I cannot understand, after the admission made to-day, that if 20 cents a can was all that the farmers of South Jersey had to pay, why was it that they used their influence, as our representative said to me, to kill the Milk bill? I cannot understand it. If the State Board of Agriculture is for anything, if the farmers are for anything and worth anything, it is that they shall stand by one another. When the farmers of South Jersey become so selfish they are not willing that we should have the same rights in North Jersey, then I say they are false to their interests—to the milk-producing interests of the State of New Jersey. I say this in all candor and in all kindness. It is not fair; it is not co-operation; it is not fidelity one to the other. If you combine so that we shall not have the same freight rates and the same rights, if it becomes necessary to return the compliment, I say we will return it, and let us see if the farmers of North Jersey cannot have the same rights that South Jersey has. That is my theory precisely. I do not know exactly what the farmers have to pay, but if it is a fact, as my friend has stated, that their rate is only 20 cents for a forty-quart can, and the freight in North Jersey is 35 cents a can, it is unfair and it is a breach of faith. It was not fidelity on the part of farmer towards farmer when you stepped in and defeated that bill, and said “you shan’t have the same rates we have.” In other words, you said to the near-by producer, “we will shut you out of the market and allow a competing railroad to go 400 miles and impoverish the milk-producing districts of New Jersey.” I am surprised, and I hope the farmers of South Jersey, if this or a similar bill is presented, will act in the future not as in the past—as was stated in the report of the Secretary of this Board—one section demanding fair freight rates and another section just as strenuously opposing it. I say to you, gentlemen, this is the greatest trouble with the farmers to-day. They can’t work in unison. Now I ask the question in all candor, if you get your milk carried for 20 cents a can, why, in the name of common fairness, did you come here and defeat the bill when the farmers of the upper portion of the State asked simply to be put on the same basis with yourselves? If that bill is introduced again, I say to you, gentlemen, in all candor and in all frankness, if the same powers defeat it again as defeated it last winter, the farmers of the upper portion of the State will say that “self-preservation is the first law of nature,” and they will look out for themselves. [Applause.]

The Chair—I am sorry to break in on this discussion, but we will probably have time to finish it later. This evening you will have an opportunity to discuss many topics, and we hope to have a full attendance. One matter we have lost sight of, and that is the subject of taxation. It seems to be the impression that as we now have a State Board of Taxation the matter is settled. I wish to disabuse your minds of that idea, to a certain extent. We have this Board of Equalization, but while they are doing a good work the law should be amended. They have made a report on the subject embodying the conclusions they have arrived at, and this report has been printed. They say that between sixty-eight and seventy-five million dollars' worth of property escapes taxation entirely. You will find this on page 24 of their report. They would like an expression of views of the farmers of the State on such matters as they have recommended. If we have anything to recommend we should take it up, and if not then we may let the matter rest. I know, however, they wish an expression from this Board. I hope you will have time to look through their report and see what they recommend, and come here to-morrow prepared with the matter in shape to take such action as may be thought desirable in regard to the equalization of taxation.

On motion, adjourned until 7:30 P. M.

SECOND DAY.

EVENING SESSION.

The Chair—The Board will please come to order. Are there any resolutions, or any miscellaneous business to come before the Board at this session?

Mr. McBride—I beg leave to offer the following resolution, and move its adoption without reference:

“Resolved, That it is the sense of the State Board of Agriculture here assembled, that the producers of Northern New Jersey shipping milk to the New York and Jersey City markets should have the same rates of freight on milk that those shipping to Philadelphia and Camden markets have, and we hereby pledge ourselves to do all in our power to secure the passage of a bill which shall give them the

same advantages now enjoyed by South Jersey producers, provided said rates be fixed at not less than twenty cents per can of forty quarts."

Adopted.

Dr. Parry—I move that a resolution be adopted by this Board, asking for legislation by which the present Skim-milk law applying to cities shall apply to the whole State.

Mr. Anderson—I would like to know the provisions of that law before we take a vote on it.

Mr. Crane—It prohibits the keeping for sale of skim milk in cities of the first class. The attempt was made to have the law apply to the State, but it was simmered down finally to cities of the first class; I have heard several gentlemen here to-day say that it would be a great benefit if it extended over the whole State. The very party who opposed that measure, Mr. Abbott, has made thousands of dollars in his business, and his business has had a wonderful increase; he is now paying six cents for milk. The provisions of that act have put thousands of dollars in the pockets of New Jersey farmers.

Dr. Parry—I am not able to give the exact text of the law, but I know the law works well, and I would like to see it extended over the State.

Mr. Lippincott—So would I. I have been acquainted with the milk business, and the only thing the dairymen have to fear particularly is this skim milk business, because the milk-dealers buy it for the dilution of their whole milk, cutting off the sale of just that much whole milk.

Mr. Evans—I am in favor of the resolution and hope it will prevail, but I do not want the impression to go out that Mr. Abbott is making money out of skim milk. He is paying the same price now he did five or six or perhaps seven years ago. I do not remember when I began to ship to him, but the price has not been increased since.

The Secretary—Does he make a difference in the price throughout the year?

Mr. Evans—He pays six cents from October to January, and from the middle of January to the first of May five cents; the balance of the year is fixed according to the milk; these have been his rates for years. He also has different grades of milk; his A milk is supposed to analyze 14.50, and he wishes his shippers to maintain that standard

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or average. The B milk should analyze 13.50, and he expects it to average that through the year.

Mr. Anderson—I want to say on behalf of Trenton that it would be a great disadvantage to many people here who cannot afford to buy anything but skim milk, and who could not buy more than half the quantity of whole milk. We, as producers, have to make skim milk, and it would be a loss to us if it could not be sold, and we believe it would be bad for the town.

Dr. Parry—I think this has all been thoroughly considered. Take all the cream out of the milk, but do not sell the skim milk. It is a fraud on the buyer. They don't buy any more of skim milk than they would of whole milk. They might at the start, perhaps, but in a little while they would come back to a certain quantity of milk. With good milk they will buy more of it. Instead of injuring their children they will benefit them, for skim milk is not an advantage to children.

Mr. Anderson—I can refer you to healthy growing children who are fed on skim milk, and I cannot believe that it is injurious to them.

Dr. Parry—If you skim your milk right you can't bring children up on it.

Mr. Tine—I will have to differ with our friend from Mercer county in regard to the sale of skim milk being an advantage to either producer or consumer. In our section the creameries, after creaming their milk, sell it to the farmers for feeding their hogs. I could not support any bill that would interfere with that business.

Mr. Evans—In reference to feeding skim milk, my experience in feeding a large number of calves shows that it is far better to take whole milk and two-thirds water and feed it, rather than take the whole amount of skim milk. I have no doubt that principle will apply to children also, and I know it will reduce the cost to less than that of skim milk, and any physician will say it is better for the child. In many cases the solids in milk are too strong for the stomachs of children.

Professor Voorhees—In seems to me we ought to look at this matter from a different light. I should be sorry to see this State Board go on record as claiming that skim milk is of no value as a food. It is true, in creaming the milk we take the fat out of it, but the fat is not the only good there is in it; the remainder is also nutritious. I would not like to see such a resolution as the one proposed

passed. As to the matter of the nutrition in skim milk, it is, in a measure, as good as whole milk. There are cases where the cream or fat is of particular and peculiar advantage. There are also cases where the removal of this cream or fat is also of equal advantage. There are some children who can't drink whole milk, and in such cases it is better to have a part of the fat removed. I would not like to see this Board go on record as saying that skim milk has no value.

Mr. Blish—What percentage of solids is left in the milk after passing through the separator?

Professor Voorhees—That will depend upon the method of separation. Perfectly separated we extract the fats and leave a small proportion of solids.

Mr. Blish—What per cent. of water?

Professor Voorhees—Supposing when you start you have 12 per cent. of solids, of which 4 per cent. is fat, the balance, 8 per cent., of solids, and deducting that from 100 per cent. you have the water.

Mr. Blish—You take out only the fats in skimming?

Professor Voorhees—There is more or less casein mixed with it; it leaves about 8 per cent. on a perfect separation, but you can hardly make it perfect.

Dr. Parry—Does not a great deal of the casein come out with the cream in separator milk?

Professor Voorhees—Yes, sir; some of it.

Dr. Parry—Separator milk, from the best separators, is a food not at all suitable for a child. No dairyman would permit it to be fed to his calves.

Professor Voorhees—You cannot say it is not nutritious.

Dr. Parry—You can say it is pernicious if applied to a child.

Professor Voorhees—You make the point it is not nutritious?

Dr. Parry—We say it is a food of very faulty nutrition. We do not say it is devoid of nutrition, but we claim it is not a food which should be used as a nutritious food.

Skim milk has a medicinal value, but it is a fraud to any one who attempts to keep alive on it—I refer to separator milk. It is a very fair diuretic; it is very good for certain diseases, but not for a man who wants food.

Mr. Ebert—I would like to ask those familiar with the two kinds

of skim milk what difference there is between the two; does the separator extract more than the ordinary skimming?

Dr. Parry—The separator separates very much more of the fat and casein than the ordinary method of skimming.

Mr. Ebert—That is what I wish to know. I am glad Professor Voorhees spoke as he did, for I would not like to say there is no nutriment in skim milk. In ordinary cooking the Professor knows better than I do that we use too much of the carbo-hydrates; in the manufacture of flour everything is extracted except the starch, and very little else is left in it. In ordinary cooking we get too much of the carbo-hydrates, and this is what we extract in skimming milk. In ordinary cooking the milk perfectly skimmed is best, and there is too much of the carbo-hydrates left even after skimming. We have cases on record where men have lived for years on skimmed milk, in perfect health, and twice skimmed, too. I would be sorry to see this Board go on record as claiming that skim milk is of no value as a food.

Professor Brewer—Are there no laws outside these cities you refer to—laws governing the sale of skim milk? Are there no sanitary laws relating to the sale of skim milk?

As an officer of the State Board of Health in another State, and as President of the Local Board of Health, this is a matter to which I have given a great deal of attention. As a matter of fact, in the city where I have been connected with the health administration we find it impracticable to interfere or prevent the sale of skim milk as whole milk. I believe there is a legitimate sale of skim milk if it can be controlled, for there is a food value to skim milk, although I should not like to live on it entirely. I think some State law, by which the purity of milk can be guaranteed, would be more to the point. Some plan might be made; for instance, taking away the license if the dealer were found selling skim milk for whole milk.

Mr. Anderson—The Board of Health or Common Council have an ordinance that all cans for skim milk, out of which it is to be sold, shall have a plain mark as to the contents. Any milk sold out of cans not marked the Inspector has the right to seize it and dump it in the gutter. This would break the thing up if followed out.

Mr. Lippincott—The sale of skim milk by the creameries has robbed the farmers out of hundreds of thousands of dollars. I will admit that hand-skimmed milk is of some value, for I have lived on

it for three months, as I was compelled to do so, but it was not separator-skimmed milk. I know of a farmer over in Pennsylvania who is a large manufacturer of butter; formerly, when he skimmed his milk by hand, he kept large numbers of hogs, which were fed on the skim-milk; since he began the use of separators he has been obliged to give up the hogs entirely, as there is not sufficient nutriment in the milk.

Mr. McBride—I think the point brought out by Prof. Brewer is a very pertinent one, and my understanding is that outside of these cities of the first class skim milk can only be sold as skim milk, and that it must be marked as skim milk, in order that there may be no misunderstanding about it.

I would move the resolution be laid on the table until the exact condition of the law can be ascertained.

So ordered.

The Chair—I will appoint Senator McBride and Dr. Parry a committee to look up the law in regard to this milk question.

The Secretary (later)—There was a resolution laid on the table for a little while, to enable Senator McBride and Dr. Parry to look up the law on the milk question; that should be disposed of if that committee is ready.

Mr. McBride—I have the law here (reads).

It seems to me as the law now stands, it is sufficient and plain.

The Secretary—I move that the motion be taken from the table, and considered.

So ordered.

Mr. Evans—Does the law now apply to the whole State, except to those cities of the first class?

Mr. McBride—Yes, sir.

Mr. Lippincott—We want a resolution to prevent the adulteration of whole with skim milk.

Mr. McBride—That point is already covered by the law in Section 2.

Mr. Lippincott—But who adulterates? We know it is done, but how, or by whom?

Mr. Tine—If the Inspectors do their duty they will stamp it out of the market. When the people asked for a law compelling 12 per cent. of solids they meant to stamp it out; now they will want it reduced.

Mr. Lippincott—The gentleman who presented that bill never wanted it reduced. It was George Abbott. We tried to have a similar bill passed in Pennsylvania, the same as in New Jersey, but did not succeed.

Mr. Crane—Is there any other than separator skim milk sold?

Mr. Anderson—There is no separator skim milk sold in Trenton.

Mr. McBride—Is the skim milk sold here in accordance with this act?

Mr. Anderson—Yes, sir.

Professor Brewer—I think the difficulty this gentleman who has spoken has tried to bring out has not been covered. As I understand it, the skim milk that is sold here goes beyond the borders of the State and is not under the control of your laws; it is then used, in Philadelphia and New York, for the adulteration of whole milk. It seems to be beyond the reach of your laws, unless you can stop it before it gets that far.

Mr. Lippincott—We hope to remedy it through the Dairymen's Association in Pennsylvania. Heretofore we have had no association over there, but now they are all around the vicinity of Philadelphia.

The Secretary—As this matter now stands, the resolution does not refer the matter to the attention of any one. If you wish it to go to the Legislative Committee, they should have it referred to them, to secure the passage of a bill, if possible.

Mr. Lippincott—I offer that as an amendment, that it be referred to the Committee on Legislation, to use their efforts to secure the passage of a law to this effect.

Mr. McBride—I move that the bill, with the amendment, lie on the table until to-morrow morning at 11 o'clock. I do this as a matter of courtesy to the introducer of the resolution.

So ordered.

On the following morning Dr. Parry withdrew his resolution relating to skim milk, by common consent, and stated—In withdrawing this resolution I wish to state that I think we have attained the desired object, in that the members will take the matter home with them and consider what had best be done with the skim-milk question in the future.

The Chair—The next business on our programme will be a lecture on the "Grass Product of New Jersey," by Mr. J. H. Denise, of Freehold. Mr. Denise is known to you all and requires no introduction.

GRASS PRODUCT OF NEW JERSEY.

Mr. President and Gentlemen—Our Secretary, when at our place last summer, was riding with me through the country when I asked him if he did not think it would be well to devote one evening or one afternoon of the State Board sessions to a Farmers' Institute, for practical talks; my reason for making this suggestion was, that last winter I heard a number of farmers say they thought we should assign some part of the session to a time for general remarks, where members could talk of matters of local interest pertaining to our varied work. Out of that grew this part of the programme. Shortly after this he wrote me he wished me to prepare a paper on the grass-product of New Jersey; I made up my mind I was in the grip of the Secretary, and could not get out of it. I will do the best I can with the matter I have in hand, and hope you will bear with me, because I am not accustomed to this sort of work. I know how hard it is in our County Boards to start the ball rolling, so I will do what I can, and hope you will all take part and discuss the question fully.

Of the grasses cultivated in this country there are said to be about thirty. The number and excellence of our natural grasses are probable unsurpassed in any country. The thrift of our wild animals, or our domestic animals when feeding on the prairies, has fully demonstrated this result. I shall limit myself mostly to the grasses that are grown in our own locality.

Although the clovers are not properly classed among the grasses, but as belonging to the lucern order, they are so closely allied in their usage to the grass product that I shall number them as members of the same family. I am inclined to place timothy in high rank on the list. It is indigenous to this country. It flourishes and grows to perfection on the rich clays and clay loams of this and adjoining counties. It occupies a large area of our mowing-lands, and what is more beautiful to look upon, on your farms, than a luxuriant growth of fully-headed timothy grass, free from all foreign matter?

Orchard-grass is valued for pasturage in shady places, or on light, thin soil, and needs to be cropped closely. If gathered for hay, harvest before too ripe, or it will become woody and worthless.

Blue-grass is worthy of a place on the list. It has but little merit as a hay product, but is valuable for pasturage.

Red-top is a hardy, luxuriant grower ; loves a moist soil and grows well under favorable circumstances, and is highly relished by cattle and sheep. Like its brother, blue, it does not please the hay-buyer.

Clover.

Alsike is proving to be a valuable item of forage growth, both as hay for winter feeding and summer pasture ; for feeding purposes all classes of stock prefer it to any other of the grasses. It is superior in fragrance and tenderness to all other varieties of hay, and stock will pull it out in preference as opportunity may offer. Its stems are small and tender and so there is less waste in feeding. It comes in season for hay-making about the time of red clover and is as easily cured ; for a hay crop, may be mixed with either red clover or timothy.

[Mode of sowing grass seed, preparation of soil, were here stated.]

Allow no weeds to ripen to seed, that we may have a thoroughly clean grass-seed bed ; fine the surface soil to a depth of two or three inches. There is not sufficient care taken in the preparation of the land to receive the seed. Seed to grass in connection with winter grain, the latter part of September or first of October. Thin seeding of grain with high manuring is preferable, as grain will tiller more, thus making a stiff straw, and is not so liable to lodge and choke out all of the young grass. Follow the grain-sowing with a light harrow, then sow five or six quarts of timothy seed. From February 1st to March 20th, sow five quarts red and one quart of alsike clover per acre. If soil is quite sandy I would harrow first, and then sow seed and roll in both instances. No loss of grain from harrowing. If failing to get a good catch of grass, sometime in early August, a damp spell if possible, scarify the surface with a disc harrow and sow the requisite amount of seed ; follow the sowing with a Thomas smoothing harrow. I have had good results from three trials of this character.

In case of a heavy growth of clover after grain has been taken off, it should be pastured—or if mown off, allowed to remain on the ground for a mulch. If left to grow, injury may result from the harboring of mice and by their eating the crown of the clover plant, and sometimes from too much growth is liable to smother. On the other hand too close cropping will not answer. No infallible rule can be adopted on account of variations of climatic conditions. If we have

a proper mixture of the grasses named, and an average amount of moisture the following season, we should gather from two to three tons of dried hay per acre. If the first cutting is light on account of drought, and we have a good second growth, harvest this, but do not mow too late, nor shave too close. If we fail in getting a fair mixture of clover, we will not get the quantity named, as timothy will not give a heavy yield the first year's cutting. Do not pasture too close nor later than September 10th.

Second Year's Mowing.

To insure a heavy crop spread evenly, after grass has a little start in spring, about one hundred and fifty pounds per acre of nitrate soda. With sufficient rain this should give a yield of three tons per acre on good grass-land. At any time after hay is taken off until the following April, apply as a top-dressing about fifteen loads of well-decomposed, or, if not of a strawy character, fresh manure to the acre and then harrow in spring to scatter it evenly. You can count on about three tons per acre if nature favors you with sufficient rains. An occasional dressing with farm-yard manure induces a thickening of the grass, and assists the grower to keep down the weeds. At all hazards, remove all weeds from your mowing-lands, and grow only *grass*—and you have a quality of hay that will command the highest figure.

This application will have cost about \$20 per acre, giving an extra return of one and one-half to two tons—leaving a marginal profit of \$3 or \$4 per acre. I would now alternate between a high-grade, home-mixed chemical fertilizer, five hundred pounds to the acre, and barn-yard manure. This depends on the proportionate cost of the two articles. Grass-lands thus treated will give a profit for five or six years. We now have a very heavy sward, and a soil full of vegetable matter, and in an excellent condition for a cultivated crop of any kind. A test of land the past season having received the aforesaid treatment, gave at the rate of one hundred and four barrels potatoes to the acre with no manure. With an application of fifteen hundred pounds of a home-mixed chemical fertilizer, one hundred and fifty-two barrels per acre—giving for an outlay of \$25, forty-eight barrels per acre—and an outlay of \$50 gave a yield of onions at the rate of six hundred and seventy bushels per acre.

These figures appear to show that a well-fed soil will give back to its tiller ample returns for a full dose of plant-food. It is an accepted fact by all thoughtful farmers that in this age of competition and expensive labor there is no profit in the cultivation of more acres than we can properly enrich to make them produce maximum crops, atmospheric agencies being normal. Question—What are we to do with the land? Grass comes to the rescue and offers us the needed panacea for the correction of this suicidal practice of too much farm tillage. Keep more land in grass. If not suitable for mowing-lands, enrich just the same, making three blades of grass to grow where one grew, enabling you to keep three cows where one was kept, having three milk-cans to take to station in place of one. Carting is all same.

Farm-yard bank account and national bank account will double up, and the land having had the needed rest, will, under tillage, double up its return, and a new era will dawn upon the farmer making grass the basis of his operations.

Quality of Grasses.

For pasture, white clover and the natural grasses, under actual test, have produced more pounds of beef and milk and butter of a better quality than timothy and the clovers. Every stock-farm should have some permanent pasture-land, especially where sheep are kept. About fifteen years ago I cleared a piece of heavily-timbered land. The soil has never been disturbed, nor a seed of any kind sown upon it. It has been dressed every alternate year with the following applications: Lime and marl the first year, stable manure, complete chemical fertilizer and ground bone, in the order named. This land produced an abundance of the best pasturage possible. Sheep, being good scavengers, are the best stock to clean and clear a piece of new land. With their help and the aid of the manure-pile the waste places may be made to blossom with fertility. By no means allow sheep to pasture newly-seeded grass-lands.

Composition of different soils makes it a little hazardous to prescribe manuring compounds for permanent pasture-lands, but the productiveness of all such lands may be largely increased by the various available aids at our disposal.

For Hay.

Our aim should be to produce jointly, the most profitable and salable article for our immediate markets. This includes for the New Jersey farmer, the clovers and timothy, with perhaps a little red-top for low lands. We cannot well divorce these and grow hay for profit. Without a mixture with the clovers we will fail to get a heavy yield of hay at the first cutting.

What shall we do with this clover hay? Some one has said "the cheapest manure a farmer can use is clover seed." I would like to meet him half way and add chemicals. Chemicals to make potatoes and clover—clover to feed with the coarser grains for milk and mutton, and the manure of the farm-yard for timothy grass.

Chemists tell us the manurial value of a ton of clover hay after having been fed to stock, is rated to be worth as plant-food, \$6 to \$8 per ton, and further, that where three tons of clover hay have been harvested from an acre, that the clover roots upon that acre contain from seventy to eighty pounds of nitrogen. These things are worthy of our closest study.

An experiment on wheat that was seeded in the spring to clover, gave the following result: One hundred and fifty pounds nitrate soda increased wheat 30 per cent., reduced the clover yield 12 per cent.; 130 pounds sulphate ammonia increased wheat 22 per cent., reduced clover yield 14 per cent.; 300 pounds muriate potash gave no increase in wheat, increased clover yield 24 per cent. Lesson—Nitrogenous manures had a marked and beneficial effect on wheat, but did positive harm to the clover. A crop of timothy will be taken from this plot the coming season and results noted.

A heavy crop of clover makes a larger draft upon the soil than many other crops—yet aside from this appropriation, it gathers and deposits plant-food in the surface soil for the succeeding crop. These are noted results from experimental work. A crop of clover grass was allowed to remain on a piece of land and this with a similar piece where the grass was all removed. Two cuttings for hay. A part of each planted to onions and a part to mangel-wurzel. The result was decidedly in favor of the unmown plot, valuing the grass at \$7 per ton for hay on the ground.

In the palmy days of wheat-growing in New Jersey you could grow as much wheat per acre on a good clover sod by plowing under

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the second growth, as you could on an oats fallow with fifteen loads of manure per acre. I am of the opinion that in certain instances it would pay the New Jersey farmer to allow a season's growth of clover to remain on the land, and then plant to potatoes. A plot of ground thus treated under my supervision proved this statement.

Cut the first growth and let it remain on the ground and if second growth is heavy treat it the same. It goes without saying that we must not rob our farms entirely of this nitrogenous product.

I would like to emphasize the fact that we as agriculturalists must join hands with the scientific branch of our work, which is sending out from the chemical laboratory aids that are indispensable to the successful prosecution of our calling.

The digging up of facts by the chemical spade will be of little avail to us, if we fail to keep in touch with its onward movement, or if we let fly the golden opportunity to note as the days pass the results of our operations. Our work requires as high a degree of thought and intelligence as does the mercantile or professional walk.

I find that an outlay of an average of \$10 per year for three successive years on a timothy grass sod, gave me a net income of \$4 a year per acre. Average yield about three tons. Offsetting the extra work of harvesting and marketing by improved condition of land.

I wish now to draw a comparison between the product of our New Jersey mowing-lands and their reasonable possibilities.

Statistics give us the following figures for an average of fifteen years: Number of acres mown for hay, about 500,000; total yield, 600,000 tons; average yield per acre, $1\frac{1}{5}$ tons; average price, \$12 per ton; total valuation, \$7,200,000.

The net income, as already shown, by an outlay of \$10 per acre, was found to be \$4 per acre. Allowing a reduction of one-half this amount for conditions that may step in the way, we have 500,000 acres at \$2 per acre, making a grand total of \$1,000,000, to be divided among the New Jersey farmers. This would buy ammunition enough to shoot every wolf that stands growling at the door, and to hang the thief of discontent higher than Haman. The figures as shown give us 20 per cent. on capital invested—not quite equal to national bank stock, or a dip at the public crib, but will answer for a stepping-stone toward the downy pillowing of the favored few.

The grass for hay and pasture is estimated to exceed in value all the grain product of the State.

In this State, where wages are high, we must raise large crops per acre, or there will be no margin for profit. There is no place in our country where high farming will better pay.

Hay often commands a high price and not infrequently affords more real profit than any other portion of the farm. Now with our improved facilities for harvesting, the labor of hay-making is greatly lessened.

The only difficulty seems to be to keep up and increase the annual growth of good grass. Weeds and inferior grasses, can hold their own as long as poverty exists, but with a liberal supply of manure, the superior grasses overgrow and drive out the bad grasses and weeds. To reach the goal of success in our calling, three things are essential, namely—science, art and industry. To divorce these means failure. Who are willing to put their shoulders under the burden and carry it on to victory?

The Secretary—I move a vote of thanks to Mr. Denise for his valuable paper on the grass product.

Unanimously concurred in.

Mr. Forman—How do you keep the clover in the second year?

Mr. Denise—I only want it one year, because it injures the quality of the hay the second year; the first year I keep for my stock, and the second year's growth is cut for market.

Mr. Budd—You spoke of eradicating the weeds in your grass; there are some weeds I find I cannot eradicate. How can you do it? In our county we are greatly plagued with the plantain, and some of our best lands are being overrun with it. Can you tell us how to get rid of it?

Mr. Denise—That is one of the worst weeds we have. I find that two or three years of cultivation is a great help. Then sow thickly with timothy, well manured, in the fall. You have probably noticed that on lawns you can bring in natural grass in this way, and if you can get a good set of grass I think this will remedy it.

Mr. Budd—That answers very well for other kinds of weeds. I have farmed buckwheat, corn and oats, and though the whole thing disappeared for the time, it came in again as bad as ever.

Mr. Denise—We hardly know how to manage it.

Mr. Budd—It is going all over the country, and is getting a complete supremacy of many of the best fields.

Mr. Goble—Do you mean the plantain with the large flat leaf, the plantain which we see around the house ; has it spikes ?

Mr. Budd—It has spikes, and a broad leaf.

Mr. Brown—It is frequently sown in the clover seed ; if low-priced clover seed is bought there are many impurities in it ; buy only the best clover seed, and this will remedy some of the trouble.

Mr. Denise—One good way to get rid of plantains and other weeds of this character, is to let sheep run where the dog now runs.

Mr. Meech—Have you tried the combination of orchard-grass and clover, instead of timothy and clover ? In my experience the timothy and clover don't come to maturity together ; orchard-grass does better with clover than the timothy with clover.

Mr. Denise—We tried it but could not cut it with the machine we had, and therefore abandoned it.

Mr. Anderson—How many acres have you in your farm ?

Mr. Denise—We can till one hundred and fifty acres.

Mr. Anderson—How much of it do you till ?

Mr. Denise—We usually mow about seventy acres ; of course we also pasture some, and some is sown in winter grain. Potatoes and grass are my principal crops. These are what we depend on.

Mr. Anderson—Where do you get your manure from—do you make it or buy it ?

Mr. Denise—Both ; I buy some New York horse manure.

Mr. Fisher—You spoke of clover after wheat—have you had success with grass after plowing under clover ?

Mr. Denise—It seems almost impossible to get clover to take after plowing clover under. I don't advocate that. I don't think it pays to do it.

The Chair—We would like to hear matters of interest discussed by the members at this time, as you will notice by the programme that "Suggestions as to Conducting Farmers' Institutes" has been provided for ; have the gentlemen any remarks to make on that subject ?

The Secretary—In some places where we have held Farmers' Institutes interest has been aroused, but in others there is not so much. It is like a school ; farmers are growing into it and beginning to see that agriculture can be improved and advanced in this way, and we hope it will be an important aid towards extending knowledge in the various lines of our work.

We have had a most excellent address on the dairy to-day, but the subject is not exhausted. For the last few months I have heard and read of dairy schools, and a gentleman in this convention has said to me that he would be glad to have such a school here. He has also made a generous offer to aid in defraying the expenses if such an effort is made. The whole general subject is one which interests us, and I hope some suggestions may be made, or some criticisms expressed, that will be of value.

Mr. Denise—Have there been institutes held under the auspices of the Board during the past year?

The Secretary—Not altogether. I would state, however, that the Secretaries of County Boards have almost invariably consulted with the Secretary of the State Board in regard to topics, speakers, &c. I am glad this is so. It makes the work uniform and sympathetic. In two or three cases the Secretary has been called on to preside. In others the local authorities have managed that themselves.

Mr. Dickinson—It was our privilege to have an institute in Salem county a few weeks ago. It was presided over by the Secretary, Mr. Dye, and from the remarks I have heard from the farmers of our county and those who were not farmers, who attended that institute, they received a great deal of useful and valuable information. We had speakers from Pennsylvania, and one from Hunterdon county, one or two from Mercer county, and I think we had one of the most instructive meetings, a great deal more instructive than our County Board meetings, and very interesting. This meeting, for the first in the county, was well attended, but Mr. Dye knows better about that than I do. Another held there would probably be a great deal better attended. I think it has done a great deal of good, and if this one is a criterion, they would be a great advantage in every county in the State. For my part, as a farmer, I would like to see others held with us, and all over the State, for the good of agriculturists; I also think Mr. Dye makes a very good presiding officer, ready to answer questions, and we received from him very many valuable suggestions. We also had some little home talent displayed, which we thought very good.

I think these institutes can be made productive of a great deal of good without any very heavy expense. Some thoughts may be brought out and some very valuable hints given in papers prepared by practical farmers, like that delivered by Mr. Denise here to-night.

Questions should be asked and discussed fully in order that all may be benefited by practical ideas brought out.

The Secretary—The institute at Woodstown was well attended; the body of the Opera House, where it was held, was filled. Farmers and their wives, ladies and gentlemen turned out in full force, as they do where the Grange takes possession of the people. We were disappointed by the absence of one or two gentlemen who were to have spoken, but the members took hold and made it a very instructive meeting. The more the institute takes on the character of a good school the better. This is the way to develop home talent and to help one another.

Mr. Brown—I would like to say one word for Gloucester county. We had an institute held there under the direction of Secretary Dye, a year ago, and another one was held there last November, and the general feeling and impression is that they were very interesting and helpful, and we all hope to see the time when more farmers will take an interest and push the movement forward more rapidly. There is already an increased interest in the matter, and it should grow in every county in the State.

Professor Voorhees—In regard to Farmers' Institutes—as to their value and so on—I would like to say one or two words, and also in regard to their management. There can be no question about the value of Farmers' Institutes. We do not always regard the institute as the place where we can get instruction, and a great many of the farmers who attend are not willing to take part in the work, and we do not, therefore, get the full benefit of such instruction as might be secured. This is very largely due to the innate modesty of the New Jersey farmer. I have very carefully looked over the work of a number of States where these institutes are a great feature, and I have been unable to discover anything more than this—that they are more forward in telling you what they know, and in telling it so that their brother farmers may get some benefit from it. It seems to me there are two things absolutely necessary to the value and success of Farmers' Institutes here. The first is to have a first-class presiding officer who will keep to the programme—one that shall cover a sufficient ground, and not too much. Second, keep every person alive and interested where the thing needs to be pushed. This means an interest on the part of every person in that neighborhood. You cannot have a successful institute unless you can get sufficient interest

aroused—unless you can have those who are most successful take part and tell you what they have done. The success of these institutes rests more with the farmers who take part in them than on any outside speakers you may get.

I have attended a number of institutes in New Jersey—at Mullica Hill, Mount Holly, and several other places—and where they have taken an interest I can safely say that the papers read there by farmers are as good in every respect as those made so much fuss about in other States, where institutes are reported as being so wonderfully beneficial. We do not hear enough from these men. You do not want to go out of your own neighborhoods for your addresses. If you will take our State Board reports and read some of the papers presented at the County Board meetings you will find them just as good as, if not better than some of those in other States. There they made a big time over institute work, and print and sell their proceedings. We have in the one report of the State Board of Agriculture for 1891 more of genuine benefit to farmers than is contained between the covers of the report of the Institute of Wisconsin for 1890, notwithstanding so much is said about it. Our papers are better prepared, more logical, and in better shape than those of Wisconsin. Why are Wisconsin institutes quoted everywhere? If you want to make your institutes a success you must brag a little, and say we are just as good as the rest. There is a good deal in that. I have been over this State from Sussex county to Cape May, and must say in the meetings I have attended I have met with farmers quite as capable of giving instructions as those who claim to be, in other States, the leaders in the work. Take a paper like Mr. Denise's—it should revolutionize the method of raising hay; it is every bit as good as the papers on hay by T. B. Terry, who is quoted everywhere. If you want to be quoted you must crack up your own institutes and tell what they are doing. You must all take an interest; here is a man who is successful in this particular thing—let him come to your institute and tell about it—let him come and tell his neighbors. So it is in all lines of work; we learn by attempting to tell what we know; if we do it we know it and if we know it we can tell it, if we think so.

Mr. Denise—There is no better way for the farmers to get this education than to have the Professor come there and teach them, and very soon you will have so many speakers you can't use them all.

Mr. Goble—Send them to Essex, then. [Laughter.]

The Secretary—We have with us my worthy predecessor, Mr. Taylor, and I move that the courtesies of the Board be extended to him.

Unanimously concurred in.

Mr. Taylor—Mr. President and gentlemen of the State Board, this is hardly a fair way to take me. I came here with the promise from the President that I should not be called on to say anything. I am very much obliged to you for your courtesy, for it is a great pleasure to be with you again. I have noticed from time to time the proceedings of this Board, and am glad to see you are progressing. My home now is part of the time in Philadelphia, but most of the time in Kansas City, Mo. I am not interested in farming, but in a trust company there, and in railroads.

I think you have taken up in the road question a subject which is of vital interest to the whole country, and especially so to farmers. It would seem that good roads are the one thing necessary to bring back the value of lands in this part of the country. It may seem like a tax at the present time, but the farmers will reap substantial benefits from road improvement. I am very glad indeed to see that your Board is taking up such measures, and I believe your action will be closely watched. Our roads are bad in the West, and are probably about where our roads were here fifty years ago, and the improvement is necessarily slow, but the work is a good one, and should be pushed to completion.

I thank you for your compliment. [Applause.]

On motion, adjourned until to-morrow morning at 9:30.

THIRD DAY.

MORNING SESSION.

The Chair—We will call on Mr. Meech to invoke the Divine blessing.

Prayer was offered by Mr. Meech.

The Chair—Our programme calls for miscellaneous business; are there any committees ready to report?

Mr. Budd—There have been a number of inquiries made in this Board to find what the State Board, or the Commissioners appointed by the State, are doing with regard to a creditable exhibition of our products at the coming World's Fair at Chicago, in 1893. Other States are expending tens of thousands of dollars to make exhibits that will attract the attention of the whole civilized world to them, as being the great centers of production in the United States. From all the indications we can gather, New Jersey will make as pitiable a representation as it did in 1876 in Philadelphia. There is so much ignorance of the matter it seems a strong indication that nothing is being done. No effort appears being made to make New Jersey compare favorably with other States; in fact, it does not look as if New Jersey would make any more of an exhibit than might be expected of an ordinary farmers' club. I have started this subject to get the members of the Board to express their views, in order that some result may be arrived at that will be a credit to the State.

The Chair—I would state, for the information of the Board, that the State Board of Agriculture, as a Board, has no connection whatever with the Commissioners of the World's Fair, and that the statement made in the report of the Executive Committee covers all that has been done, or is being done, so far as our knowledge extends, towards having the agriculture of the State of New Jersey represented at the World's Fair. The difficulty seems to be in a lack of sufficient funds to enable the Commissioners to formulate plans as desired. This is the extent of our information, but I think the matter should be agitated by this Board, and everything possible done to secure a creditable representation of the farm products of New Jersey, in order that our State may compare favorably with our sister States.

The Secretary—It might be well to state that Commissioner Buchanan, of the Agricultural Department of the Columbian Exposition, soon after his appointment, opened a correspondence with the Secretary of this Board, and correspondence has been had with him frequently on the subject up to the time the Commission was appointed for this State, which seemed to take the matter out of our hands. That Commission has invited the Executive Committee of this Board to meet and confer with them, as stated by our President. Conferences have been held, and we have been asked to make an estimate of what was considered necessary to make a creditable representation at the fair, of the agricultural interests of the State.

The Executive Committee named \$17,000. The Commission desires a larger appropriation for the State, and I think \$100,000 will be asked for ; but \$20,000 has been appropriated as yet for the purpose. Just what portion of the appropriation the Commission may set over for the agricultural interests of the State we are unable to predict. So far as we are concerned officially, we have no power to do anything, nor do we know whether we will be called on to do anything.

Mr Budd—I would like to hear a general expression of opinion from the members. This will perhaps have a good deal of weight in the future determination of that subject, as well as to the character of what may be done. The agricultural interests of the State have an undoubted right to a fair share of the appropriation.

Mr. Crane—I received a communication from Mr. Meeker, of Newark (who was appointed by the Governor, with some other gentlemen), in regard to this matter. I am aware that some of our stockmen contemplate taking some active part in exhibiting at the World's Fair, and a number of breeding cattle will probably be sent to the fair by these gentlemen. One of them has a fine herd of Ayrshires and Guernseys, which he proposes to exhibit at the fair. He was out in Michigan last year at the State Fair, where he made a very fine display, and received quite a premium, which has encouraged him to go further, and he now contemplates going to the World's Fair. I think every encouragement should be given to any one desiring to make a display, so that New Jersey may make a good showing.

Mr. Ward—I would like to add a word on this subject. The Commissioners who were appointed a few years ago for the New Orleans Exposition called together the gentlemen interested in the various industries of the State to meet with the Governor, and to ascertain what, in their judgment, would make a creditable exhibit representing the various State industries, and they were afterwards instructed to go ahead and make a State exhibit. The means at that time were still more limited, the whole cost not being as much as was appropriated last winter—\$20,000. What has been done with this money is hard to tell, though there will, of course, be an accounting of the moneys in the hands of the Commission. Circulars have been sent out, and, as I understand it, the Executive Committee of our State Board had one or two conferences with these Commissioners as to how the agricultural interests were to be represented at this fair.

If I am rightly informed, no encouragement has been received that any share of this \$20,000 would be granted us, and that there has been no understanding as to any preliminary work that should be done. The Executive Committee of the State Board, the State Horticultural Society, the State Experiment Station connected with the college, are all about in the same position. They know not what to do, nor what steps to take, to represent the agricultural industries of the State at Chicago two years hence. The Experiment Station proposes to ask for an interview with the Commission at some early date, before the bill asking for a further appropriation is submitted, and there and then to submit estimates of what, in their judgment, will give to the State a creditable exhibit of what the Experiment Station is doing. This Board has also, I understand, an estimate of what an agricultural exhibit could be made for. This should include the horticultural interests of the State to come in as an adjunct to this, and on the same basis. Surely the Commissioners should understand that a creditable exhibit of this kind cannot be obtained without funds, nor without a guarantee that a certain amount will be appropriated. I think it is necessary for us to express ourselves strongly on these matters at once. Unless a certain amount can be pledged to us the agricultural interests cannot be represented, and rather than make a poor exhibit I would advocate making none at all.

Some of the Western States, I am told by one of the United States Commissioners, Mr. Smith, are making great preparations for the agricultural industries of their respective States. We must recognize the fact, in asking for a share of the amounts appropriated by the State for this purpose, that our agricultural industries represent only about 14 or 15 per cent of the industries of the State, therefore we cannot claim more than that amount of the appropriation, but we should have that much. The question of State aid will not be of so much importance to manufacturers, for they expect to increase their business by their exhibits, and it will be an aid to them in this way, from a business point of view. There is no benefit coming back to us to pay for the expense of making an exhibit, and the only advantage is to the State, but if I was a manufacturer, and sent my goods to the fair, I would expect a return in the way of orders—enough to pay for my trouble. The agricultural interests should receive a fair proportion of the moneys to be expended by the State, and we should put in our claim now, and insist upon it that if we are not fairly rep-

resented it will be impossible for us to make any exhibit in Chicago two years hence.

The Secretary—Mr. Ward is entirely right, and the point made by him is a strong one; the same thing was touched on early in the correspondence of the Executive Committee. The point made was to advertise New Jersey as a desirable State, to attract desirable settlers within her borders; the exhibit would not be of advantage, personally, to one in ten thousand of our farmers. That point has been urged both before the Governor and before the Commission.

Mr. Beans—As an individual farmer, I would like to make one suggestion. The exhibition we make on that occasion, no matter how imposing it may be, will be but an aggregation of units, while all other industries will make special and individual efforts; the artisan will do his best work, and the thing he exhibits will be to the utmost of his skill, hoping to secure business by his exhibits; his products are not general, while those of the farmer must necessarily be so, except in the case of a few specialties. We ought to do our very best as farmers, of course, and it is a question whether a selection of crops had not better be made, so as to make such exhibits a triumph of agricultural skill. The crops should be sent to some place where the officials in charge can have access to them, and make the best selections, and we should work, not only as individuals, but for the general success of the exhibit, whatever it may be. The different contributions should be added together as one great exhibit, and our officials can use them in this way.

Mr. McBride—In order to dispose of this matter, I would suggest the matter be left in the hands of the Executive Committee, to make the best possible arrangements with the World's Fair Commissioners for the agricultural interests of the State of New Jersey. I offer that as a motion.

Mr. Williams—I hope they will include the horticultural interests as well. I have been in correspondence with the authorities at Chicago. When they first issued their schedule on Horticulture they were appealed to, and we got in the classification. At Washington I met the Chief of the Horticultural Department, and he was very anxious that New Jersey should present a fair exhibit of her horticultural products; I have had several appeals from other interested parties since, and I have turned all the correspondence over to the Horticultural Society. From present appearances everything is yet in the dark as to where

the necessary funds are to come from to defray the expenses of the exhibit. I am afraid New Jersey will be kept as much backward in this matter as she has been forward in other things heretofore, as so little has been done as yet by the State, from all we can learn. Applications for space made thus far have been by individuals; I understand one farmer will expend \$30,000; I am told he has engaged several thousand feet of floor space at the fair; it is also stated that other private parties will make creditable exhibits, but the State should also be represented with a general exhibit of her agricultural products, and every possible assistance should be given the farmers of the State, as neither agricultural nor horticultural industries will derive patronage from these exhibits. The exhibit should be sustained by the public, and everything sent in should be exhibited as a State exhibit.

Mr. Ward—I would move to amend that motion by having one member of the State Horticultural Society added to that committee.

The motion as amended was unanimously adopted.

The Chair—Are there any other resolutions to be offered, or any committees ready to report?

Mr. Baldwin—I would like to offer the following resolution, and move its adoption without reference:

“Resolved, That the New Jersey State Board of Agriculture respectfully recommend Mr. T. Fassat Rackam as superintendent of the poultry, &c., department of the Columbian Exposition.”

In offering this resolution I would like to say that Mr. Rackam is the best qualified man in the United States for the position. These are strong words, it is true, but there is no doubt about it. At the Madison Square Garden in New York they found it necessary, or advisable, to come to New Jersey to get a Superintendent and Secretary, and I think it would be a great honor to New Jersey to be thus represented at the World's Fair.

The resolution was adopted.

Mr. Ward—The special committee appointed to consider the matters brought up by Mr. Buchanan have a partial report to make, if in order:

“WHEREAS, The postal service is for the whole country and for all classes of citizens, and the benefits of the system should be apportioned in a manner as nearly uniform as possible to all

classes of citizens regardless of places of residence ; *and whereas*, the extension of the free delivery service to the rural districts would work a practical revolution in the condition of the country ; therefore,

“ *Resolved*, That we are highly in favor of extending free postal delivery in our rural districts wherever practicable, and that we commend the action of our Postmaster-General, Hon. John Wanamaker, for his efforts to secure the same, and that our Committee on Legislation urge our Senators and members of Congress to such legislation for the accomplishment of that project.”

(As expressing the sentiments of this Board in relation to the further development of Western lands at government expense, gambling in futures and food adulterations, the action of the Board's committee of 1890 is here inserted. See, also, eighteenth annual report, page 320.—SEC'Y.)

“ The committee look with disfavor on any project looking to the opening up of any more of our public domain for years to come. We are also opposed to any schemes of irrigation at government expense, in order to bring non-productive lands into market for agricultural purposes. There is a great abundance of land in the older States that can be had at very low prices, considering the improvements and advantages, most of which do not exist in newer regions, and we claim that the abnormal development of our public domain by whatever scheme of government aid secured, and the literal giving away of those lands to corporations and through them to individuals, has worked great injury to our older States, and to the farmers of the whole country. And not only in the matter of overproduction, but our vast and valuable public domain has been taken up by foreign immigrants and syndicates through the agencies and facilities named to such a degree that the children and grandchildren of the men and women who gave their lives and property during the war to save the country are, or soon will be, deprived of any share in that domain at government prices. We ask that Congress turn their attention for a while to lands in the East and aid in developing and filling up this section of our common country, and when this will hold no more, our children—the overflow from America instead of from Europe—will have some virgin land left to homestead and settle upon.”

“ While large capital is necessary to carry on certain legitimate corporations, which may require combination of capital, we are opposed to, and call upon Congress to outlaw such combinations of men and means as deal in the necessities of life, especially of farm produce, in such a way as to crowd the individual producer out of the market, and by controlling the same, rob him of a fair price for

his products, while at the same time they are advancing the price to the consumer far beyond what he would have to pay the producer in a market unrestricted and open. These methods of creating fictitious crops, and *vice versa*, or 'gambling in futures,' should be annihilated.

"The same arguments apply with equal force to combines and trusts organized to control the price of farm animals, and the beef and pork markets.

"We call your attention also to the absolute need of further and more stringent laws for the prevention of adulteration of the necessities of life. Spurious, cheap and unwholesome goods are put on the market branded as honest goods. It is evident we cannot produce the pure article as cheaply as the bogus can be made. This matter is growing more and more serious, as it relates to dairy and pork products. By adulteration and a bogus article our exportations of honest butter have fallen from nearly \$7,000,000 annually to about \$2,000,000, and now our cheese industry is threatened by putting on the foreign market 'filled cheese,' an article which has aroused the just suspicion and indignation of foreign purchasers. (See last report of the Secretary of Agriculture.) *If the producers of honest goods must compete both in the home and foreign market with the makers of spurious cheap imitations, the last encouragement to their production will have been taken from them.*"

On motion, the report of the committee was concurred in.

Mr. Baker—I have a resolution I wish to offer in regard to the award of premiums on stock :

"*Resolved*, That the State Board of Agriculture recommend the State Premium Committee to adopt the suggestions given by Gov. Hoard in awarding the State premiums on stock that may in the future be exhibited at the Waverly Fair, to wit, horses, cattle, sheep and swine.

"That score-cards be issued and a conspicuous bulletin-board stationed, whereby spectators can better understand and follow the points of awards made by the several committees acting on the same."

On motion, adopted without reference.

Mr. Budd—The Committee on Fruits and Appliances on the tables here will report as follows :

J. M. White, New Brunswick, five varieties of apples, three specimens each of Golden Pippin, Ben Davis, Monmouth Pippin, Smith's Cider, Nero, all perfect specimens as result of spraying with arsenic and sulphate of copper.

Thomas J. Beans, Moorestown, four specimens of apples—York

Imperial, Ben Davis, Willow Twig, Fallowater, all perfect but one specimen; sprayed with arsenic compound.

John Repp, Glassboro, shows five specimens of pears, Duchess d'Angoleme, five specimens of Beurre d'Anjou, and three specimens of Vicar of Winkfield, which are remarkably-preserved, fine specimens; having sprayed with arsenic and sulphate of copper dissolved with ammonia.

J. H. Denise, Freehold, specimens of American Giant potatoes, no fertilizer used, yield 104 barrels per acre, raised on soil that had been manured in previous years for the production of hay.

H. I. BUDD,
V. P. HOFMANN,
E. P. BEEBE.

On motion, adopted.

The Chair—I take great pleasure in introducing Professor Bevier, of Rutgers College, who will address you on the extension work of the State Agricultural College.

AGRICULTURAL COLLEGE UNIVERSITY EXTENSION.

I wish to speak just a word to you as the representative of the State Agricultural College at New Brunswick.

Being a New Yorker myself by birth and early training, but one who had to come over to New Jersey to make his living, I was much interested in listening to the previous speaker to observe the patronizing tone that New Yorkers assume when they come over here to tell us how things ought to be done. It must be confessed that they teach us very well. It reminded me of a story I once heard of a Jersey farmer who went to a New York specialist to be examined for insomnia. After careful questioning the physician discovered that he slept well enough at night but that the trouble was that he could not sleep after dinner. [Laughter.] The story I need not say was told by a New Yorker.

Over against this I wish to place the opinion of one who has a large acquaintance with the farmers of this State. In speaking with him the other day I said that out in Wisconsin a great deal was being said and published about educational work among the farmers. "Yes," he said, "but though they make more of a noise about it, they are not doing any better work and are no more intelligent than the farmers right here in New Jersey."

The State Agricultural College aims to help the farmers. You

have given more attention to practical farming than have I, but we all know that to make farming a success the farmer must be a man of intelligence. He should be a careful student of his business; he should shut off the little wastes wherever possible, and he needs the same high order of intelligence as the manufacturer. This is increasingly true in proportion as the number of educated farmers increases. You must study carefully the particular needs of your farms, you must understand plant growth, and the best methods with domestic animals—in a word, you need to keep up with your business if you would succeed in these days of competition.

The State College offers, first of all, a good four years course in agriculture. But comparatively few men can spare four years of their life to devote to study in college. If a young man has the time to take such a course he often chooses at the end some other occupation than that of farming. In the second place the college offers a short winter course, for which no fees whatever are charged, but the number availing themselves of this is comparatively small. The business of the farmer will not permit him to spare the time for this course. The work of the farmer should be engrossing even in winter. The intelligent head of the farm cannot be spared.

This state of things has caused the college to take another step in advance—and that is to offer to the farmers throughout the State instruction in scientific agriculture at various centers wherever they desire to make arrangements for securing it. The expense is borne in part by the college, and in part by the community desiring the services of the college lecturers. The college secures lecturers as competent as can be found and meets all the expenses of administration and organization of the work, asking the community where the lectures are given to pay the fees of the lecturer.

The work is done on the system known as University Extension, and consists, first of all, of a course of lectures, generally twelve in number, on some subject touching agriculture. By this means the college can give the instruction where it will do the most good, *i. e.* the college goes out to the people instead of waiting for the people to come to it. Such lecture courses we are ready to arrange wherever sufficient patronage can be secured.

The second feature in the system is the class hour. We all know that a lecture of an hour on any topic is likely to go in at one ear and out at the other. After each lecture, therefore, an hour is devoted to

a full and free discussion—a kind of intellectual clearing-house. This brings out more fully all the points touched on in the lecture, so that every one can get a full understanding of the matter treated. This, I think, is the most important part of the system, for if it consisted merely of lectures, much of the information could be gathered as well from books. It is personal contact between teacher and learner that makes these lectures so valuable. It was said by Mr. Garfield that the only university he wanted was a wooden bench with Mark Hopkins at one end and himself at the other, and the stress he placed on the person as against the apparatus of instruction is justified.

A course of extension lectures on agriculture is now in progress in Freehold ; the work was begun there about two weeks ago and will continue during the winter. Four or five of those instrumental in establishing that center are present here in the audience, and I am sure they will corroborate what I have said about the value of this kind of work. Negotiations are now in progress with another center, but whether a course of twelve lectures will be established there this winter or not I cannot say. Within a few days negotiations will be closed one way or the other.

The action of the Board of Trustees of the college in this matter was taken late in October, and it was the middle of November before the matter could be laid before the public. It is a matter for congratulation that it has been taken hold of so promptly, not only by cities and towns but by the farmers of the State, who have grasped at once the significance of this movement in its relation to agriculture. Under this system the lecturer gives his audience the best knowledge that he possesses, and in return draws out the practical information and experience of his hearers. By this co-operation the best advancement in scientific knowledge can be secured. The extension movement has taken root in Wisconsin, but owing to the vast extent of that State it has been impossible to cover its entire territory. The contrary will be true in New Jersey, covered as it is by a network of railroads, and with a comparatively small area. All parts of the State are easily accessible from the State College. The Agricultural College and Experiment Station wish to pay back to the farmers of New Jersey the debt they owe, and can by this method best promote the agricultural interests of the State.

I thank you, gentlemen, for your attention during the few minutes placed at my disposal.

The Secretary—It is gratifying to know that since the university extension has been begun in this State in other lines of thought, it is now beginning in the agricultural line also. This matter has been dwelt upon and emphasized in the report of the Executive Committee. We are making progress; our railroad facilities are excellent, and the most distant neighborhoods can convene at a common center without great expense of time or money. If farmers will rally and co-operate in this movement, and if this Board and the County Boards will co-operate, we may look for great things from this movement in the near future. The State College is doing a good work, and we hope to see it succeed.

Mr. Bevier—I should like to hear just a word from some member of the committee at Freehold to tell us how the lectures there are liked, and how the course recently begun is patronized.

Mr. Forman—I am greatly pleased to have the opportunity to express my opinion on this matter, and I am gratified to be able to say that the course of lectures is pleasing beyond all expectation. We have had two lectures delivered, the expense has been comparatively slight, and I have heard several say they have already had the worth of their money out of it. The ten lectures yet to come will, therefore, represent a clear profit. Our lectures are delivered in the afternoon, and take about an hour. I think we have started right at the bottom, and the fundamental principles of agriculture have been ably presented by Professor Voorhees. These are presented in such a plain way that they can be readily understood by every farmer in the room. As we go on, the subject seems to grow more and more interesting, and the attendance is increasing, and we have many people come in to hear these lectures—people who are not farmers, but interested as a matter of instruction—people from other branches of business. If my recommendation is worth anything, I give it most heartily, and I hope to see them established everywhere.

Mr. Denise—We have had quite a number of County Board meetings, and we have usually had the best talent possible to come and talk, but we have not been very successful in getting people to attend. I said to a gentleman the other day, "Why don't you come and see us? We have extended several invitations to you to come to our County Board, and we would like to see you there as well as at the lectures." He said, "Why, Mr. Denise, I have \$3 invested in this thing, and I am going to get my money's worth out of it." He

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had a little money in it, you see, and he attended. [Laughter.] When they get these things for nothing they won't come; that has been my experience, and this is an illustration of it. We have about 100 members, and I advise all our good friends to get the college extension if you can.

Mr. Meech—What is the cost of this course?

Mr. Denise—The offer made to us was \$20 a lecture. We have twelve lectures, and the expense is \$20 per lecture, and the lecturer's railroad fare and expenses, whatever they may be. We put the cost at \$3 per member, as we thought we could get from 85 to 100 members; we got \$300 in all.

Mr. Bevier—The question of financial management is one that should be explained from the central office. The rates charged are as stated for this year, but may be somewhat different another year. We shall have to provide for this outside work by employing a larger force at the college. We have this year one extension lecturer outside the regular college faculty, and we shall need more if the movement grows. This extra force of teachers has to be paid in large part out of the receipts at the various outside centers; nevertheless, I think that by co-operation, a number of places taking the same course, the cost may be reduced to \$200 or even less for a unit course of twelve lectures. I believe I am safe in saying this, but how much, exactly, the charge will be I am unable now to state. We shall make it as low as possible. We do not expect to make the work self-supporting, but hope to pay the lecturers out of the local revenues received, leaving the cost of printing, traveling, &c., of the college officers to be paid by the institution. When you add up one course with another, this amounts to a considerable sum. We feel that as the State College for the Benefit of Agriculture and the Mechanic Arts we are bound to recognize in a practical way our obligation to the State, just as the State has recognized and will recognize her obligation to give us her cordial and generous support.

Mr. White—I move a vote of thanks be extended Mr. Bevier for his instructive address.

Carried.

Mr. Ege—The Committee on Resolutions beg leave to report the following resolution, offered by the Atlantic County Board of Agriculture, favorably:

"*Resolved*, That the Game laws be amended to the effect that the killing of quail be entirely prohibited. Experience in many countries has proven that they are of the greatest assistance to farmers in destroying countless numbers of injurious insects and seeds of noxious weeds."

Reported favorably and report concurred in.

Mr. Lippincott—I would move that the Committee on Legislation be requested to secure the passage of a bill authorizing the killing of hares wherever they can be killed. They are doing a great deal of damage girdling trees, and so on. One man had fifty-seven trees girdled in this way. There was a bill passed last year, I believe, but it was not signed by the Governor—we do not know why—but we would like it passed again. These hares girdle the trees, eat the cabbages and citrons, and do damage in many ways.

The motion was concurred in, and the matter referred to the Permanent Committee on Legislation.

Mr. Bodine—I desire to make a report, which is as follows :

Your committee appointed to audit the account of the Treasurer, has examined the books and vouchers placed in our hands and report them correct.

E. B. VOORHEES,
H. F. BODINE.

TRENTON, N. J., January 21st, 1892.

The Secretary—I desire to state, as you will notice on the programme, the Road Convention is called to meet at 2 o'clock. It was thought better to have that meeting organize separately as a Road Convention, but we do not want the Board of Agriculture to think they are going to lose their identity in the matter. We want the farmers to attend this convention and take part in the discussions, and if a permanent organization is formed, we want the farmers to be well represented. The convention will be comparatively free, as we could not lay down rules. It must govern itself. Several people have been invited to speak, some of whom are present, and others will be here, and we look for good results.

Mr. Ward—Do I understand this Board is about to adjourn *sine die*?

The Chair—A recess will be taken until after the Road Convention.

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On motion, a vote of thanks was tendered to the officers of the Board, to the Executive Committee, and to all those who have aided in making the sessions of the Board a success.

On motion, a recess was then taken until after the Road Convention. (See Road Convention proceedings.)

After which, the Chair—Are there any committees to report, or any resolutions to be offered?

Mr. Denise—I offer the following resolution, and move its adoption:

“*Resolved*, That this State Board recommend the Legislature now in session to pass a bill for the better protection of sheep and poultry against the ravages of dogs.”

Concurred in.

The following resolution was also unanimously adopted:

“**WHEREAS**, In view of the recommendations of His Excellency Governor Abbett that a commission on the equalization of railroad freights has been accepted by the report of the Committee on Officers’ Reports; therefore, be it

“*Resolved*, That the State Board of Agriculture do hereby recommend the Permanent Committee on Legislation to use their influence to have the authority of the State Railroad Assessors extended to meet this long-desired abolition of discrimination in freight rates.”

On motion, adjourned *sine die*.

FRANKLIN DYE,
Secretary.

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NOTE.

A number of counties made a statistical report of the yields of the several farm crops for the year 1891, and also a comparative statement relating to the increase or decrease of farm stock. The figures *as reported* to the Secretary are given in his report, page 40.

In the County Board Reports which follow there are a number of valuable papers and discussions, as also records of experiments made, which will well repay careful attention.

FRANKLIN DYE,
Secretary.

ATLANTIC COUNTY.

ATLANTIC COUNTY BOARD OF AGRICULTURE.

OFFICERS FOR THE YEAR 1892.

President.....PHILIP BERGMANN.....Egg Harbor City.
Vice President.....WILLIAM A. ELVINS.....Hammonton.
Secretary.....VALENTINE P. HOFMANN.....Egg Harbor City.
Treasurer.....FREDERICK FIEDLER.....Egg Harbor City.

BOARD OF DIRECTORS.

CHARLES KRAUS, Germania Fruit-Growers' Union, P. O., Egg Harbor City.
GEORGE FREITAG, Egg Harbor City Agricultural Society, P. O., Egg Harbor City.
BERNARD GRAWE, Atlantic County Agricultural and Horticultural Association, P. O., Egg Harbor City.
JOHN SCULLIN, Hammonton Fruit-Growers' Association, P. O., Hammonton.
J. E. HOLMES, Hammonton Fruit-Growers' Union, P. O., Hammonton.
D. U. BROWN, Director-at-Large, P. O., Elwood.

DELEGATES TO STATE BOARD.

WILLIAM A. ELVINS (two years).....Hammonton.
V. P. HOFMANN (one year).....Egg Harbor City.

ANNUAL REPORT.

BY V. P. HOFMANN.

MEETINGS.

The Board held two meetings during 1891. The first was an afternoon and evening session held at Hammonton on February 28th, with a very full attendance.

The President, Theo. H. Boysen, M.D., made a brief address, expressing the hope that Hammonton would take an interest in the proceedings of the County Board, and believed it would be to the mutual advantage of every section of the county for all to unite.

He then introduced Prof. Byron D. Halsted, who gave an interesting lecture on the diseases of the sweet and round potato, accompanying his lecture with charts and illustrations. He classified the many forms of rot, and explained the causes of the diseases, and how they were disseminated from one field to another.

Mr. Franklin Dye, Secretary of the State Board, was then introduced, who made a brief address, owing to limited time. He distributed reports of the State Board, and stated that the audience would find South Jersey was not slighted in the reports. In fact, he was particularly interested in this section of the State and he was highly pleased to see so many young men present and also so attentive. New Jersey has the best system for disseminating information of any State in the Union, and there is a list of five thousand farmers at the Experiment Station, to whom bulletins are regularly forwarded. Organized agriculture was advancing all interests, and such meetings as these teach the farmers how to escape difficulties, also to afford mutual protection and to secure their objects. The Governor of our State is much interested in the interests of farmers and will do all he can to assist agriculture.

In the evening session Prof. J. B. Smith entertained the audience for an hour and a half; subject, Entomology. He stated that as a rule an insect has four stages—larva, pupa, beetle, butterfly, &c., according to the kind. He then explained the nature, characteristics and remedies to be employed against the codling moth, plum curculio, the flat and round-headed borer, the pear slug, the peach borer and louse, the blackberry, currant and squash borer, and the rose-bug. The Professor stated that if fruit-growers would send specimens of diseased twigs as soon as danger appears, instead of waiting until the season was over, much valuable information could be obtained.

The annual meeting was divided into a morning and afternoon session, and was held at Egg Harbor City, on December 5th, 1891.

The Secretary reported that he mailed the questions for annual crop reports to every town and township in the county, but only received responses from Chas. D. Saalman and D. U. Brown for Mullica township, C. P. S. Garwood for Egg Harbor township and William A. Elvins for Hammonton.

Messrs. Wm. A. Elvins and V. P. Hofmann were appointed delegates to attend annual meeting of the State Horticultural Society.

The following resolutions were presented :

“Resolved, That the Game laws be amended to the effect that the killing of quail be entirely prohibited. Experience in many countries has proven that they are of the greatest help to farmers in destroying countless numbers of insects and seeds of noxious weeds.”

“Resolved, That a law be enacted, that all persons who do not effectually destroy the wood, canes, roots, &c., found infested with borers, rot, &c., thereby aiding in their further propagation or dissemination, shall pay a penalty for every non-compliance, one-half of the fine to be paid to the party who makes information thereof.”

These resolutions were freely discussed and finally adopted. They are to be transmitted to the Committee on Legislation of the State Board.

Theo. H. Boysen, M.D., read a paper entitled—

IS THERE DANGER IN SPRAYED GRAPES?

That the use of the copper mixtures for the prevention of grape rot and other vine diseases is eminently successful, no longer admits of a doubt. Whoever has tried them is enthusiastic in their praise. Grapes can again be profitably grown. But, lo and behold, barely have we succeeded in vanquishing one enemy when up rises another. The remedy is worse than the evil it sought to cure. Disease and death are spread broadcast over the land. Every bunch of grapes is the bearer of a deadly poison.

The Boards of Health of New York, Newark, Paterson, Jersey City, &c., have, with very commendable zeal, confiscated, condemned and destroyed—by covering them with *carbolic acid* [*sic*—every pound of grapes they could find which showed any signs of the very dangerous and extremely-poisonous Bordeaux mixture. Great flaring head-lines in the newspapers proclaim these facts to the public, and every farmer or grape-grower would be a fool or a knave who would ever again dare to apply the Bordeaux mixture to his vines. Better send no grapes at all to market than to send poisonous, death-bearing fruit.

Shall we quit growing grapes?

Within a day or two after the confiscation of the alleged poisoned grapes in the markets of New York, a notice was published in some obscure corner of the various papers, stating that the Board of Health had, after due consideration and an examination of the facts, lifted the embargo and allowed the sale of the grapes, even though they were covered with Bordeaux mixture. What are the facts?

Professor Galloway, the Chief of the Bureau of Vegetable Pathology of the U. S. Department of Agriculture, sent an assistant to New York, who assured the wise men of the Department of Public Health that a man could eat a ton of grapes covered with Bordeaux mixture, without getting a poisonous dose of copper into his system. In parts of France and Switzerland the use of Bordeaux mixture is compulsory; every grape-grower must use it or quit growing grapes. The government demands it. Most assuredly, these governments would long since have prohibited its use rather than enforce the same, if there was any evidence of danger in its use.

Scientific research has proven that copper is not nearly as poisonous as it is popularly believed to be. Phillips, in his work on *Materia Medica*, says: "Galippi could not poison dogs with pure copper salts, for small doses were tolerated, and large ones were so nauseous that he could not get enough swallowed or retained. Ducom and Burg also report that dogs can take from fifteen to sixty grains daily of *soluble* salts of copper for a varying time without ill effect. In man, small doses ($\frac{1}{4}$ grain) of a *soluble* salt of copper exert a *tonic* astringent action. The effects of frequently-repeated minute doses have lately excited special attention, on account of the adulteration with copper of many preserved vegetables. Thus, in the French preserved *green peas* 0.31 to 0.56 grain has been found in each tin, and by some chemists and even medical men, this quantity has been pronounced injurious. Vulpian, however, says that any copper compound contained is *insoluble* and *harmless*, and that no evidence exists to the contrary; and Galippi, after eating them freely for some time, found no bad results."

Only a few days ago a British court decided, after a judicial inquiry, that the preserving of green peas was allowable, because the use of copper in their preparation was not deleterious to the health of the consumers. We also see, from the above quotations, that in small doses copper even acts as a tonic. But beside all this, the copper found on grapes in the form of Bordeaux mixture, is insoluble and therefore inert.

Many pounds of grapes were eaten by the various members of the writer's family, but he has never observed any deleterious effects. When used in the manufacture of wine the copper is *all* precipitated during the process of fermentation, and the finished wine shows only the barest traces of copper, if any (less than one grain in 1,000 gallons). But one thing has been overlooked in all the discussions of this question, and that is the fact that it is a very easy matter for every housewife to effectually remove *every trace* of copper from sprayed grapes. All that is necessary is to dip the grapes into a mixture of common vinegar and water, or of sulphuric acid and water. Take about a half pint of vinegar or a quarter pound of sulphuric acid to a gallon of water. Dip the grapes into this mixture for a moment and then rinse them with clear water, and every trace of copper will be gone; and even the most fastidious and timid person can then eat the grapes without fear of copper-poisoning. This proceeding is simple and within the reach of every one, and it might be a good suggestion for every grape-grower to have a small card printed, describing the method of removing the copper stains from the grapes, and attach it to every basket of the fruit sent to market.

MISCELLANEOUS DISCUSSION.

In the afternoon, Mr. D. U. Brown, of Elwood, spoke on Ensilage. He has the only silo in practical operation in this county, and believes that by a more general application of this system it would solve the problem how to keep up the fertility of the farm and to produce fertilizers at the lowest cost, and found that green fodder could be kept successfully for two years.

Prof. E. B. Voorhees, of the State Experiment Station, was then introduced, and held an instructive discourse upon the subject of "Chemistry of the Farm," illustrating the same with several diagrams. He dwelt particularly upon "What manure is and what makes the plants grow." He advised farmers to co-operate, and buy the ingredients of fertilizers direct and prepare the fertilizers themselves, thereby saving nearly one-half of the dealers' charges. As a general rule he would add more fertilizers to the soil than actually required for its normal growth. Upon the conclusion of his remarks a vote of thanks was tendered to him.

Mr. F. C. Regensburg stated the result of experiments he had

made with wood ashes on his grape vines. Early in the season he found his vines infested with a small variety of caterpillars; he dusted the vines with ashes, and found a few days thereafter that they had entirely disappeared. He repeated dusting the vines with ashes several times during the season and found that his grapes remained rot-free, no berries fell to the ground, the foliage remained green until frost, and the wood was well ripened. Where he had not applied the ashes the grape rot appeared. Although he had rooted out last year six hundred of his vines, this year's yield was greater than it was eight years ago with double the number.

Secretary Franklin Dye said he considered ensilage a question that should engross every farmer's attention, as it will solve the problem of more economical farm practice. All those measures which would in any manner alleviate the farmer's burdens should be utilized, but it seems that many through carelessness or ignorance ignore such measures as Farmers' Institutes, book-farming, &c. The Agricultural College has started a short winter course of study in agriculture, including about ninety lectures and laboratory work. As tuition was free he would suggest that those having the available time this winter should embrace this opportunity of obtaining much-needed knowledge. The State Board had been successful in impressing upon the managers of the State Normal School that the teachers should be taught the rudiments of agriculture. He was glad to see farmers organize. In matters of legislation, reforms in the method of taxation had been embodied and had already been instrumental in righting inequalities in taxation existing in Camden, parts of Hunterdon and other counties.

GENERAL REMARKS.

To judge from present appearances the greater part of our uncultivated and forest lands will be in the hands of so-called land syndicates within a short time. From active exertions already being made by one of them in Hamilton township, it would seem that within a few years from hence thriving towns and farms will flourish thereon and the area of arable lands be greatly extended.

There was such a bounteous crop of orchard fruits that they for a time glutted the market, realizing hardly any returns; in consequence a large amount of cider was manufactured.

The grape crop exceeded all expectations; no such crop has been

harvested within the last eight or nine years. It was remarkable in this respect, that in some localities the berries remained perfectly sound without applying any preventives, while in others where they were not applied they suffered from the rot. The general experience proves conclusively that in order to obtain a perfect and full crop these preventives must be applied in time and persistently. This bountiful crop was utilized by our wine manufacturers in replenishing their rapidly-decreasing stores of wines, induced by the poor vintages of the past years. From present computations, in the vicinity of Egg Harbor City alone over 100,000 gallons of wine were manufactured.

Small berries did not yield as bountifully as in some of the previous years, but the prices obtained were remunerative. Crops in general have been satisfactory to the farmer.

Swine have decimated to some extent in various parts of the county through the ravages of cholera. Mr. C. P. S. Garwood, of Egg Harbor township, says: "Each year the number of swine raised grows less, as many of the farmers lose one-half, and in some cases more, by cholera."

Several cases of glanders appeared in Egg Harbor City, but by the prompt action of the Board of Health further cause of apprehension was removed.

The number of canneries in this county is now six.

Mr. Charles D. Saalman, of Mullica township, in his transmitted report, appends the following remarks:

"The season just past has been the most bountiful for years, and the value of farm land is advancing; long-neglected farms are brought into cultivation again. Fruit, such as apples and pears, were quite low in price, but have advanced now; cranberries were an average crop, and grapes were remarkably free from rot. Too many of our farmers follow the old way of farming, as practiced a quarter of a century ago; they never read any of our best agricultural papers, but subscribe for the political dailies or weeklies, and know little of the progress in agriculture or horticulture during the last few years as practiced and brought before the public by our great agricultural writers.

"The laws for the protection of our useful birds should be amended, so as to place a higher penalty on the killing of birds and the destruction of their nests, and giving a reward to the informers of such lawless acts. Among our most useful birds the *quail* should be mentioned as the best friend of the farmer, as it destroys countless numbers of insects and seeds of our noxious weeds, and therefore

laws forbidding the killing of these useful birds should be enacted. The Barbary States were formerly freed from locusts and other destructive insects by the fleet quail, but when the French took possession of Tunis and subjugated Tripoli, French hunters almost exterminated these little feathered benefactors, and as a consequence the locusts and other insects are nearly destroying the crops."

The following annual summary of meteorological observations, made by Henry Y. Postma, Voluntary Observer at Egg Harbor City, has been kindly placed at my disposal :

YEAR.	TEMPERATURE.			Total Precipitation.	Mean Precipitation.	Total Snowfall.
	Mean.	Max.	Min.			
1887.....	51.36	79.85	27.26	43.35	3.61	.....
1888.....	49.87	76.60	25.20	50.99	4.25	25.80
1889.....	51.67	75.50	29.80	64.04	5.33	8.00
1890.....	52.57	80.18	27.50	55.34	4.61	13.05
1891.....	51.87	77.95	28.04	60.41	5.03	9.05

There were 123 rainy days. First frost, October 25th; last frost, May 6th, 1891.

BURLINGTON COUNTY.

BURLINGTON COUNTY BOARD OF AGRICULTURE.

OFFICERS FOR 1890.

<i>President</i>	EDMUND COOK.....	Burlington.
<i>Vice President</i>	CHAS. PARRY	Parry P. O.
<i>Secretary</i>	HENRY I. BUDD.....	Mount Holly.
<i>Treasurer</i>	JAMES LIPPINCOTT.....	Mount Holly.

BOARD OF DIRECTORS.

EMMOR ROBERTS, Burlington County Agricultural Society, P. O., Moorestown.
JOHN DARNELL, Mount Laurel Farmers' Club, P. O., Mount Laurel.
B. F. BISHOP, Coopertown Progressive Farmers' Club, P. O., Burlington.
ARTHUR J. COLLINS, Pomona Grange, P. O., Moorestown.
EDMUND BRADDOCK, Medford Grange, P. O., Medford.
ROBERT TAYLOR, Columbus Grange, P. O., Columbus.
EDWIN SATTERTHWAITE, Crosswicks Grange, P. O., Crosswicks.
JOSHUA FORSYTHE, Pemberton Grange, P. O., Pemberton.
JOSEPH LUNDY, Rancocas Grange, P. O., Rancocas.
ALBERT HAINES, Moorestown Grange, P. O., Moorestown.
NATHAN S. WRIGHT, Edgewood Grange, P. O., Burlington.
THOMAS J. BEANS, Director-at-Large, P. O., Mount Holly.

DELEGATES TO STATE BOARD.

THOMAS J. BEANS (two years).....	Moorestown.
JOSHUA FORSYTHE (one year).....	Pemberton.

MEETINGS.

The regular meetings of the Board are held at Mount Holly, on the second Saturday of August and December, at ten o'clock A. M.

BURLINGTON COUNTY AGRICULTURAL SOCIETY.

President, Henry I. Budd; Secretary, John B. Collins; Corresponding Secretary, H. I. Budd. Address of all, Mount Holly.

STATE BOARD OF AGRICULTURE.

MOUNT LAUREL FARMERS' CLUB.

President, Edmund Darnell; Secretary, Japhet B. Joyce. Address of each, Mount Laurel.

COOPERTOWN FARMERS' CLUB.

President, Jos. E. Bishop; Vice President, James A. Stuart; Secretary, and Corresponding Secretary, John C. Stuart. Address of all, Beverly.

COLUMBUS GRANGE.

Master, Charles Decou, Trenton; Secretary, Robert Taylor, Columbus.

CROSSWICKS GRANGE.

Master, Alfred Satterthwaite; Secretary, Elizabeth A. Rogers. Address of each, Crosswicks.

MOORESTOWN GRANGE.

Master, Jacob W. Stiles, Fellowship; Secretary, Sallie A. Dudley, Hartford.

POMONA RANGE.

Master, Edwin Dudley, Medford; Secretary, Frank Zelle, Jacksonville. Delegate to State Board of Agriculture (two years), George W. Jessup, Cinnaminson.

MEDFORD GRANGE.

Master, Isaac Nicholson; Secretary, Anna R. Ballinger. Address of each, Medford.

PEMBERTON GRANGE.

Master, Theodore Budd; Secretary, Henry Lippincott. Address of each, Pemberton.

RANCOCAS GRANGE.

Master, Joseph Lundy; Secretary, Barclay Hilliard. Address of each, Rancocas.

EDGEWOOD GRANGE.

Master, Nathan Wright; Secretary, Edmund Cook. Address of each, Burlington.

ANNUAL REPORT.

BY HENRY I. BUDD.

This year a Farmers' Institute was held in connection with and under the auspices of the Burlington County Board of Agriculture, at which there was a full attendance, and the following subjects were discussed with great profit to all concerned.

PROGRAMME.

Friday, 10 A. M.

Opening words and greeting by the President, Edmund Cook, of Burlington.

Report of Secretary, covering condition of agriculture and of farmers in the county for 1891, and including report to the State Board.

Many supplies for the farm are brought upon long credit. Has the credit system been of any advantage to the farmer? Robert M. Brock, of Bridgeboro.

2 P. M.

Diversified farming: its limit to be profitable. Clayton Conrow, Moorestown.

Some of the fungous enemies to crops—potato scab, &c. Prof. Byron D. Halsted, New Brunswick.

The spraying of plants with insecticides and fungicides, and the results. Col. Alexander W. Pearson, Vineland.

Sweet potatoes and melon culture. Thomas J. Beans, Moorestown.

Roads: how to make and keep in repair, and how to pay for them. Emmor Roberts and Clayton Conrow, Moorestown.

Saturday, 9:30 A. M.

Election of officers and regular business of the County Board of Agriculture.

The future possibilities of and profit of pears in the light of the crop of 1891. Charles Parry, of Parry.

Dairy husbandry. B. C. Sears, Superintendent of College Farm, New Brunswick.

The farmer in politics. Linton Satterthwait, Trenton.

1:30 P. M.

The rational use of manures. Prof. E. B. Voorhees, New Brunswick.

Neglected items of profit in farm practice. J. M. Dalrymple, Hopewell.

How organization has added to the profits of our milk producers. Dr. William C. Parry, Hainesport.

Our county and township taxes are increasing so rapidly and becoming so burdensome they are destroying farm values: what are the remedies? General discussion.

ORDER OF EXERCISES.

BOARD OF AGRICULTURE AND FARMERS' INSTITUTE.

December 11th, 1891.

The sessions of the Farmers' Institute under the auspices of the Burlington County Board of Agriculture was held in the Court House, beginning on Friday morning. A programme extending over two days had been arranged in conjunction with the annual meeting of the Board of Agriculture. There was a large attendance of farmers from all parts of the county. The opening address was made by President Edmund Cook, of Burlington. Life, he said, is too short for each to learn everything by his own personal experience; an easier way is to learn by the experience of others. Our prospects as farmers seem brighter, first, from our crops being large and the foreign demand great, teaching us that our interest and prosperity depend upon free commercial intercourse with the nations of the world. Second, from more favorable legislation. Third, farmers are educating themselves through their organizations to think for themselves and not allow politicians to perform that office for them, and I believe that their action will check the profligate legislation that creates new offices and pays constantly-increasing salaries, thus heaping on a crushing burden of taxation. Through direct and indirect taxation, we have come to be the worst-taxed people on the face of the earth. Our infamous tramp commitments and maintenance are costing our country more for each one than each member of the family of the farmer, mechanic or laborer. It offers a premium to laziness and its consequent evils at the expense of the honest toiler.

The purchase of our floating vote is defeating the will of the people, and through our organizations we hope to check this rapidly-rising tide of corruption and secure legislation that will give equal rights and privileges to all. After all, we must not forget that under the most favorable conditions, our business success largely depends upon intelligent management, strict attention and rigid economy, and not by standing still and complaining of hard times and public burdens.

He closed by extending to all a hearty welcome and a hope that every one present would freely express their opinions and give their experience upon the many subjects presented.

REPORT OF THE CONDITION OF AGRICULTURE IN BURLINGTON COUNTY.

BY H. I. BUDD.

The sands of another year have nearly run their course. The vessel of 1891 comes freighted with a heavy and varied cargo. The soil, season and elements have produced many wonderful combinations. Never before were the yields of all kinds of crops more generous.

Pears, apples, peaches and other fruits bent the boughs that bore them, until they kissed the earth beneath them. Such phenomenal yields have not been noted for half a century. Orchards of pears, with two, three, four, five, ten, twenty, and even sixty thousand baskets have been recorded in our county.

Nature seemingly sought to atone for its many years of scarcity by filling the horn of Pomona so full that thousands of bushels went wasting for the want of consumers.

Stimulated by the scarcity of, and high prices of 1890, a large acreage of potatoes and other vegetables was planted. Here, too, nature was overgenerous, and the consequent low prices that were almost continuous and now remain, testify that production along these lines has been beyond the power of consumption.

Scarcity of tree fruits and an abundant melon crop made melon-growing in 1890, phenomenally profitable. This year, with many, the crop was a comparative failure, but peaches were so abundant they crowded prices of melons below the limit of profit.

Ceres, also, has not been shy of her favors. The granaries, not

only of our county, but of this continent, are bursting and from them is flowing a golden stream of millions of bushels through the empty channels of starving Europe.

With all these wondrous gifts of a generous Providence, the natural conclusion would be that our farmers are well launched on the sea of prosperity and could have no more cause to complain of want of profit and shrinking values.

But to the farmers of Burlington county the bow of promise so brilliant in the heavens has yet but little more than stirred our hopes, for its brilliancy has been dimmed by the small returns for all these wondrous crops of fruits and vegetables. Supply far outran demand; therefore low and unprofitable prices have mostly resulted.

Our meats and grains have not as yet been marketed; therefore their prices have not been fully determined. But the promise is good, and the probably great European demand for them, requiring the productions of two or three years to fill its great void, inclines us to the belief that there is an encouraging future for the long-despised grain and grass farmer.

TOMATOES.—The crop has been large. One million cans have been packed this season by two canning factories in Mt. Holly. The total pack in this county is estimated at three million (3,000,000) cans. Large quantities were sent to the city markets, but, as a rule, failed to bring remunerative prices. About 1,800 barrels of pulp were sent by the Mt. Holly factories to New York firms to be used in making catsup.

CRANBERRIES.—Have been the largest yield of any year in their history; the crop for Burlington county is estimated at 150,000 crates, and when marketed, has brought about \$1.70 per crate.

SQUASHES.—Many tons of squashes are now being grown in our county for canning. Over 100 tons were canned this year by one of the Mt. Holly factories.

There have been large shipments of fruit and vegetables from our county to distant markets, thus relieving our home or near-by ones.

The largest part of our cranberry crop has been shipped to Chicago and the Northwest, the crop there having been a failure from frost. W. D. Staen shipped 19 cars cabbage, 4,500 each, 85,500 heads.

Roberts & Andrews shipped 22 carloads of cabbage. H. P. Rogers shipped 33 cars of potatoes and pears, 24,000 baskets. J. C. Roberts shipped 1,761 baskets of pears.

Poultry for two years has proved to be the most profitable of meat products. Its present prices are very remunerative.

Pork is too low for profit, but reciprocity promises to retrieve its fast-waning fortunes.

At last the milk producers have successfully combined and now are placing themselves on a level with other manufacturers by naming and obtaining a profitable price for their product. Their combination embraces 1,200 out of 1,500 producers for the Philadelphia and Camden markets, and the result is estimated to be that the farmers of Burlington county will in the coming year, receive \$50,000 more for their milk than if they had allowed the milk merchants to fix the price.

Hay has been about the only short crop, caused by a short period of dry weather at the critical stage of its growth, which was not relieved by subsequent rains. But the increased price from scarcity is bringing a larger money return than the great crops of 1890.

With all the favoring conditions of weather and elements, there are rapidly-growing tendencies in our economic or municipal regulations that are largely annulling our natural advantages.

First, there is a great and growing tendency among native laborers to seek employment in the towns and factories and a consequent scarcity of farm hands and an increase of their wages. A resort to employment agencies for foreign help therefore becomes a necessity. But their ignorance of our methods makes the employers' road a thorny path to travel.

The constant increase of our county and township taxes—particularly our county—is a heavy drain upon our resources with but small corresponding returns.

The taxes on many farms now amount to from one-third to one-half of their net income, a drain that rapidly decreases their selling or net earning value.

From all parts of the county the complaints to the Secretary of the Board are long, loud and deep about the taxes and the inability to find any outlay for the same except the emoluments of officers and their waste on bridges and tramps.

One correspondent asks why cannot public business affairs be conducted as economically as private or corporate ones of necessity must be to be successful and continuous.

Another says we must be protected against unjust taxation and dishonest officers or our farms will not be worth the parchment upon which their title is written.

And so the wail comes from all directions, that the heritage of our fathers is likely to be devoured by the rapacity of our tax consumers.

There is a strong expression from and growing desire among all classes for the permanent improvement of our common roads.

For some reason they have mostly been under the care of the farming population, but the inability of the rural districts to raise the necessary funds and their great importance to people of all professions, to all of whom they belong, are inducing a looking to the representative of the whole people (the State) to inaugurate and carry out a comprehensive system that will gradually make our leading highways *stone, Macadam or Telford*.

In support of this position, "The great volume of internal trade is over the common roads. It exceeds by countless tons the entire freight tonnage of all the railroads combined."

England and France are annually spending from eighteen to twenty millions of dollars macadamizing their common roads. Other European governments are following in their footsteps.

Union county, of this State, has spent \$350,000 on about forty miles, and before a year elapsed after their improvement property along the improved roads is said to have appreciated far more than their cost, and all kinds of trade have made a splendid development, and the State could easily provide funds for these improvements without increased taxation by simply diverting for a few years the immense sums that are annually turned into unprofitable channels from their usual course into the public highways.

Our military heroes could for a few years rest from their arduous training or become civil engineers and expend the \$125,000, and more, that is annually wasted at Sea Girt, in preparing highways rivaling those of ancient Rome, upon which the cohorts of commerce could easily march to victory.

There will probably be a convention at the State House, at Trenton, in the second week of next January, to consider the best method of continuing the road improvement movement throughout the State. We trust at this meeting Burlington county will be largely represented.

"Has the Credit System Been of Any Advantage to the Farmers?" was discussed by Robert M. Brock, of Bridgeboro. In his opinion

this alludes to farmers in poor circumstances, not to those who are wealthy. It is of the greatest advantage to the average farmer, and in numerous instances has been proven so. Those farmers, however, who work but four or five days in a week, and who are lazy and improvident, are the ones who have abused the credit system. To the industrious, wide-awake, enterprising farmer the credit system is of great advantage. Samuel H. Chambers had always found that the man who sells for cash and buys for cash is the man who is usually successful. The subject, pro and con, found many speakers.

Friday, 2 P. M.

"Diversified Farming : Its Limit to be Profitable," was the subject of an interesting address by Clayton Conrow, who said : "Don't depend too much on one crop ; it may fail entirely, or fall short, owing to its not having been planted at the proper time. The line between success and failure is very narrow, as profits are small. One crop overcrowds us at one season, and we are idle the next. Labor should be use economically and judiciously. A farmer should be master of the situation at all seasons of the year, and if his business is well managed he will be. He should drive his business, and not let it drive him. Every farmer should practice rotation of crops, and select for himself, depending on the character of the soil. No rule can be laid down, as soils are diversified. No crop should be selected which will interfere with another.

"A want of system and order among farmers is often a cause of failure. Good business methods are absolutely necessary to success in farming. In winter we should go over our agricultural implements and put them in shape for work. This will save time in the busy season. We should also try to arrange so we can employ our help the year round. Failure to do this has been the cause of such indifferent and inefficient help nowadays. Nearly all of the farm laborers are now foreigners, and cannot, or do not, perform farm work as well as our native help used to."

"Some of the Fungous Enemies to Crops, Potato Scab, &c.," was the subject of an address by Prof. B. D. Halsted, of New Brunswick, who said : "This subject is too broad for the time allotted to me, so I will confine my remarks to the diseases incident to white and sweet potatoes. One of the most prominent diseases of sweet potatoes,

and the one easiest recognized, is the soft rot. All forms of rot are caused by fungi. [Diagrams were shown by the speaker to illustrate the progress of the disease in the potato.] If you have one of these rotting potatoes in a box you should promptly remove it, as it will spread. Spores falling from one diseased potato on another will take root and cause an additional development of rot. A heated room, with a circulation of pure air, is not favorable to the spread of this disease. The soft rot in sweet potatoes begins when the potatoes are quite small. This rot retards the growth of the potato, or destroys it at once. Potatoes showing marks of soft rot do not grow any worse after harvesting. In black rot the progress of the disease is rapid. This kind of rot has three distinct kinds of spores formed during the life of this black-rot fungus.

"It has been demonstrated that it may be propagated from one year to another by sprouts from unhealthy potatoes. As yet no remedy has been found for this disease. In soil infested with black rot an experiment was made with nineteen different kinds of fertilizers, for the purpose of discovering if the kind of fertilizer used had anything to do with the growth of the disease. The best results were obtained with hog manure, resulting in a larger quantity of marketable potatoes, but there was also more black rot where there was manure applied. The largest crop of sound potatoes was obtained where a complete fertilizer was used. The result shows that manures favor the development of soil and black rot. The spores retain their vitality in the soil for several years. If possible the seed should be procured from a field in which there has not been black rot."

Clayton Conrow thought he could produce black rot by putting the plants in cold water.

Professor Halstead said this was hardly possible. The conditions might be made more favorable to the growth of fungi, but these could not produce them.

Secretary Dye suggested that as the germs of the disease are carried in the air they were disseminated in that way and so carried to Mr. Conrow's plants. He believed that climatic conditions had a great deal to do with the propagation of these disease germs.

Prof. Halsted—How long these germs will live in the soil we cannot say. It has been discovered, however, that the germs of onion smut will live in the soil for nineteen years. In regard to potato scab in white potatoes, excessive moisture, chemical agencies, &c.,

have been assigned as the cause. Some think it is caused by insects. Fertilization by stable manure has also been assigned, but the true cause is a fungus. Scabby potatoes when used for seed can propagate the disease under favorable conditions. Scabby potatoes are found in soil where there is much rubbish, vegetable matter, stable manure, and a too frequent repetition of the crop is apt to cause an increase of scab. Deep planting is considered best, and dark-skinned potatoes are least affected. Stable manure is believed to be favorable to the growth of scab. Lime and ashes do not tend to decrease the number of scabby potatoes. It might be advisable to try marl. Kainit has been found to be wholesome for sweet potatoes. The Bordeaux mixture is of value in preventing the spread of rot in the white potato. The same germ that causes rot in potatoes has been found to cause tomato blight. It has also been found to affect melons. I have also been able to inoculate squashes and cucumbers with the same germ. Hot-house tomatoes, notably in the hot-house at Jobstown, have been attacked by these insidious bacteria.

Charles Cranmer thought that when potatoes were dug early they were less likely to have the rot, while those left in the ground until later were more apt to.

Sweet potato and melon culture was treated by Thomas J. Beans, Moorestown.

In growing sweet potatoes and melons, the chief factor is the farmer. Good farming is unquestioning obedience to nature's laws; therefore, we should learn by observation the direction and force of these laws. This is more important with us than other localities, on account of the great variety of our soils. Upon the "Jersey sands" the sweet potato attains its highest development, in relation to quality, bright color, smooth, round form and the superlative table and keeping qualities that secure it a preference and welcome from commission man, shipper, retailer and consumer at highest prices. Such potatoes must be plowed out before frost on a bright day; place three rows together and piled so the sun may shine on them for a few hours, then carefully removed so as not to injure the skin and placed in baskets or barrels in the field, the head pressed tightly enough to prevent moving while in transit. Cranberry barrels with exceedingly small holes for ventilation make the ideal package. Then, when shipped to strangers, should be marked, "grown, packed and warranted" by the grower or shipper. When received, the head

should be removed and the barrel placed where the temperature will allow persons to sit comfortably. The round, short potato is more preferable than the long one, but the yield is not as heavy, and to secure them the plants must be set in a furrow in which the bottom is compacted, if not they grow downward indefinitely.

For melon-growing in a loose soil we draw furrows 10 feet apart, along which we spread coarse manure, and over which we form a ridge by throwing two furrows together; on this at distances of 8 or 10 feet we plant the seed, using a little fine manure or phosphate in the hill (and this is better done in a wet time); then, over the intervening spaces, put a light coat of manure or street dirt, then cross-harrow and plow all the manure and trash under, and a careful hoeing completes the tillage. From 7 acres of melons on this extremely light soil we sold this year \$365.70; from $6\frac{1}{4}$ acres sweet potatoes we sold 1,516 baskets for \$564.86. From $3\frac{1}{4}$ acres citrons, 1,065 baskets, we sold for \$317.60. Level culture does best with us. Citrons should be picked before ten o'clock each day. As with the common system, the vigor of the plant must be retained by ample nourishment and generous treatment, to resist insects and disease.

To Emmor Roberts, one of our most honored and useful citizens, we are indebted for the introduction of the Jenny Lind citron, about 1862. There have been none so reliable for vigor of vine, flavor and texture of flesh, faculty of adaptation to different localities, productiveness, attractive roughness of exterior, shipping qualities and consequent readiness of sale; it is, therefore, profitable to growers all along its career.

One of our most uniformly profitable farms for thirty years has kept constantly to the production of three crops, viz., sugar corn, watermelons and sweet potatoes; with poultry, fruit and vegetables added for incidentals I cannot see but that our sandy soils can all be profitably farmed.

THE SPRAYING OF PLANTS IN 1891 WITH INSECTICIDES AND FUNGICIDES AND ITS RESULTS.

COL. ALEXANDER W. PEARSON.

Mr. President and Friends—Within the past few years the spraying of plants with fungicides and insecticides has attracted much attention.

It may be of some interest to horticulturists if I briefly sketch my more recent experiences in this work, of which I believe I have the honor to be (in New Jersey) the pioneer.

There being this spring general promise of a fruit crop I resolved to do what I could to secure the health and integrity of mine. I accordingly provided a supply of the chemicals approved as fungicides and insecticides, bought a third spraying machine, hired extra help and planned that if anything on my little farm must be neglected it should not be in the work of *vegetable pathology*.

When my orchard trees came into blossom I sprayed apples and pears soon after the petals had fallen from the fruit with the usual Bordeaux mixture, combining with it London purple at the rate of one pound of this poison to 200 gallons of liquid. The trees were sprayed thoroughly and profusely, and only once. When the fruit ripened there could be found among it very few specimens of the usual fungous diseases, or signs of damage from curculio or codling moth.

Financially, for me, it would have been fortunate had there been more of these depredators present in my little orchard. I was at much expense in the endeavor to thin the fruit from my overloaded trees. Every apple and pear seemed bound to stick on and grow to full development. If I had not left a row of apple trees and three rows of pear trees unsprayed, I might have been led to think that this brilliant success in growing tree fruits was due to my practice in vegetable therapeutics; but the trees not sprayed hung just as full of good fruit as did those which had been doctored. I also could compare them with the fruit trees growing along the roadsides, and which have been totally neglected. These also swarmed with fruit nearly perfect.

It was evident that in this truly phenomenal fruit season my work in spraying my trees was practically thrown away.

This year the fungi and insects commonly infesting our cultivated plants have been chiefly conspicuous by their absence. I can only account for this phenomenon as the man did when asked why an epidemic of measles had not afflicted all the members of his numerous family. Said he, "there is such a swarm of us that I reckon there wa'nt enough measles to go round."

Notwithstanding the remarkable healthfulness of our orchards this year, we may very surely expect our fungous and insect pests to re-ap-

pear in the future, when we shall be forced to fight them by spraying our trees. I have seen great benefit, in former years, from these sprayings, and shall practice them annually hereafter.

To spray an orchard is a job neither difficult nor tedious. I place upon a wagon a fifty-gallon cask, filled with the spraying liquid, and rigged with a force-pump and a spraying nozzle. A man drives the team and another uses the pump. Pass along each side of a row of trees so as to reach each part of the tree. By combining London purple with the Bordeaux mixture, insects and fungi may be dealt with in one operation.

Others of the copper solutions are quite efficient preventives of the fungous maladies of the tree; but I prefer the Bordeaux mixture on account of its content of lime. The lime combined with the insect poison prevents danger of burning the foliage, which is often consequent on the use of a plain aqueous solution of the Purple. If this solution be carelessly made a little too strong, it will scorch the leaves. But it is immaterial how strong of the purple the solution be made, provided a few pounds of fresh lime be mixed in it. I have generally found that a single spraying well applied to a fruit tree protected fully ninety per cent. of its fruit.

In my spraying of grape vines this year, results have been satisfactory and instructive. With the view of ascertaining the preferable fungicide, I used several of them, applying them separately, liberally and frequently. With many varieties of the grape this season has had its peculiar influence. These varieties insisted upon being healthy anyhow, whether sprayed or not. But, fortunately for my experiences in vine medication, I have many of the "Concord"—always prone to mildew and rot. On this variety the benefits of fungicidal treatments were very manifest. By spraying with sundry copper solutions I kept my Concord vines in almost complete health, harvesting from them a good crop of nearly perfect fruit, while an adjacent vineyard of Concords not sprayed, lost all of its fruit by the brown and black rot, and all of its foliage by the grape-leaf mildew. Its new wood is not ripened, and there is poor show for a grape crop on these vines next year.

I yet prefer the Bordeaux mixture as a preventive of grape fungi, but am inclined to think that the proportion of copper sulphate in this mixture may be much reduced without impairing its efficiency. Possibly this reduction may be as far as ninety per cent. But to

earn this, there must be further trials, and these made in years more favorable to fungus epidemics. The fungi in this summer of 1891 had but small chance to fructify.

As to when the fungicides should be applied to best prevent mildew, anthracnose and rot, two full sprayings, one when the vine is forming its fruit buds, and another when it is in full bloom, are better than many subsequent sprayings. Henceforth, I shall spray my vines thus early in the season with the Bordeaux mixture, and make the subsequent sprayings semi-occasionally with ammonical solution of copper carbonate. Thus we may avoid the whitewashing of the fruit, defilement which this season has seriously hurt the sale of grapes.

In connection with this fungicidal work we have hit upon important knowledge. It seems that vines which are well sprayed with the copper salts this year, will next year show the protectiveness of this spraying, even though they may not be again sprayed. Thus we have the prospect of continued cumulative benefit from our fungicidal treatments.

If every vine in our State were annually sprayed for some years, I have but little doubt that grape mildew and rot might be practically suffocated. The only other vegetation that I know of, besides the grape, inhabited by these peculiar fungi is the Virginia creeper, *Ampelopsis quinquefolia*.

In the treatment of other plants, for instance the Irish potato, to which I have chiefly directed my attention, the especial efficacy of early and thorough spraying is proved. Begin spraying the potato plant before it is half grown, and spray the patch every two weeks until frost. Thus the blight of the leaf may be averted and consequent rotting of the tuber. I use the Bordeaux mixture combined with London purple, one pound to one hundred and fifty gallons liquid, doctoring simultaneously the fungus and the bugs.

Nowhere more than in the fungous diseases of the grape and of the potato is the saying more applicable, that "an ounce of prevention is worth a pound of cure." We might fitly say here that one grain of prevention is more worth than a million pounds of cure.

Those who have not studied the fructification of these fungi under the microscope can have hardly a conception of their fecundity. Even those who do thus inspect it, gain but a misty idea of this vast infinity of germs. One potato plant bearing the fructifying fungus of *Phytophthora infestans*—the potato blight—can spread the infection

over a whole acre of potatoes in a single day. The grape fungi are, if possible, even yet more illimitably prolific. I hardly exaggerate in stating my belief that a few years ago I had in my vineyard of the germs of mildew and rot enough to infect with these diseases the vines of the entire earth and of several outlying worlds besides.

Hence, in using fungicides, we must realize that their use shall be like the extinction of the first spark of a prairie fire; a drop of water may quench the spark, while an ocean might fail to check the conflagration which may spread from it.

I will not tire my audience by a further discussion of this topic. Each one here present already knows about as much as I may teach him. Many publications cover about all of the scientific ground of the subject, and the utilization of this knowledge must be with individual experimenters.

Before I end this paper, however, I must mention sundry interesting observations made this summer upon the effects of copper upon the soil. I have cause to fear that this mineral present in quantity in the earth we cultivate may there prevent the germination of our seeds and the growth of our plants.

By spraying seed potatoes with the Bordeaux mixture I prevented them from sprouting. The same with sweet potatoes in my hot-beds. Also, where a potato plot had been liberally sprayed with the copper solutions, potatoes planted the next year on this plot generally failed to grow.

Such is my experience, and it is somewhat disquieting. Further experience will teach us more on this point. Meanwhile, until we shall be further enlightened as to the ultimate effects of application of these copper mixtures, it will be judicious practice to apply them as sparingly as possible in their as yet indispensable employment as fungicides.

The subject, "Roads: How to Make and Keep in Repair and How to Pay for," was ably treated by Emmor Roberts, Clayton Conrow, Dr. W. C. Parry, Charles Collins and others. Emmor Roberts adduced many arguments in favor of good roads. Young men who leave us to seek their fortunes, and others, when they seek to retire, will settle in those sections only where good roads are found. Over the river the macadamized and Telford roads that are being generally built are increasing the value of property ten times. Good roads

well built will last for centuries. The Appian Way, almost perfect to-day, has stood the test of two thousand years. This was built with flags on the bottom, then cement, then fine or pounded stone. This is now called the Telford. England, within the century, has made over twenty-four thousand miles of stone roads. Macadam condemned the Telford system and adopted the system of properly draining, only using for the bed such stones as would pass through a two-and-one-half-inch ring and then to be laid twenty-four inches thick. In many places in this country good roads have been made where they were laid only eight inches thick. For sixty years no Telford was laid, although they now have become quite popular. Mr. Cassatt, one of the Supervisors in Chester county, Pa., says he will lay no more, as the large stones work up and lame the horses and eventually make a rough road. Now he builds macadamized roads at a cost of about \$2,000 a mile—9 feet wide, crushed stone, costing \$2 per yard ; 1 cubic yard, layers 1 yard wide and 2 yards in length.

Vitrified brick is being largely used in many parts of the West and in small trial sections in the East. They make an ideal road-bed, excellent footing, drain nicely and are about half the cost of Belgian block. The Western people claim for them long wear, but he did not believe they had been in use a sufficient length of time to demonstrate their durability. How to pay for them. He would suggest that the State pay for one-quarter, the county one-quarter, the township one-quarter, and the property-holders one-quarter. For the State to pay for all, political pulls would improve one section at the expense of other parts of the State.

Clayton Conrow spoke strongly upon the necessity of our adopting a system of building stone highways, and urged a general and full discussion upon the subject and pressure upon the Legislature to immediately pass laws to start the ball rolling. The dirt road must become a thing of the past if we desire to keep step with the progress of the age, and to hold and advance the value of our farms. The onward flow of population will march on and leave us if we do not attract them by improved highways.

England, France and other European governments are spending eighteen to twenty million dollars annually in building stone and permanent roads. Union county, in this State, spent \$350,000 on roads, and the result has been appreciation of their property far beyond the

cost of the roads, caused the sale of many residence sites, started many industries, and has not as a consequence increased the tax-rate.

He decried the lack of system of road-building in America, and showed how the farmer, manufacturer and professional man will be benefited, particularly the farmer, by better roads. England and France find it profitable to have fine roads all over, maintained by the government. Other European countries have good roads, sustained by the government. In America the work is devolved upon the township; the government is not applied to, which is an error.

America ranks with Turkey and the remote parts of Russia on this question. Italy is poor financially, yet they have fine driveways.

Rapid transit on railroads is receiving much attention and causing the expenditure of much money, but more farm products are carried over public thoroughfares than by rail. Yet our roads are neglected.

The expense of building public roads in New Jersey is probably less than in those States bordering on this, for, while we have to import stone, we have little grading to do. The work should always be done by a competent engineer.

State aid appears to be the only remedy, so that there would be one system all over, and the money spent intelligently. Two or three hundred thousand dollars by the State on roads, as object lessons, would be well expended. The principle is good of dividing the cost between State, county, township and individual.

If the farmers let this question pass unnoticed, the value of farm lands will continue to decrease.

Charles Collins thought it would take some time to get stone roads; in the meantime it would be well to see that the money now appropriated is spent properly. Stone roads are expensive and may not come for some time yet.

Mr. Conrow said there need be no increase in the State tax. Do away with the \$125,000 expense of the annual military outing, and hold sessions of the Legislature once in three years, and enough money will be at hand to build roads.

H. I. Budd said the road question is now being stirred, as probably it never was before, by the State Wheelmen's Association.

Secretary Dye said \$340,000 is spent annually in this State in repairing and patching old roads. This is exclusive of bridges, snow bills and opening of new roads. A bill was passed last winter to improve roads permanently, but it needs amending. The way to do it is to go to Trenton *en masse* and demand State aid.

Robert M. Brock said intelligence without pluck don't amount to much. We have done lots of business and talked a good deal at this meeting, but have settled nothing. We can't get good Freeholders; how can we expect to get men to build good roads?

Secretary Dye thought that our more important towns would undoubtedly be connected by electrical railways before long, and perhaps we would soon plow by electricity.

P. T. Burtis took the position that the roads could be easily improved with the material on hand if any disposition was shown in that direction.

Dr. W. C. Parry thought if State roads were to be built some effort must be made by the farmers of the State to secure legislation looking to that end.

ELECTION OF OFFICERS AND REGULAR BUSINESS OF THE COUNTY BOARD OF AGRICULTURE.

Saturday, 9:30 A. M.

The first subject discussed was "The Future Possibilities and Profit of Pears in the Light of the Crop of 1891." Emmor Roberts said he had about as good a crop of pears as any farmer, and good prices were realized, from fifty cents to one dollar per basket. It was certainly a paying crop. To raise pears successfully they must be given much attention, or they will not pay.

Martin L. Haines said he had a good crop but couldn't dispose of it at any price. He did not think the Kieffer variety fit to eat.

Judge Forsythe stated his crop of Bartletts was finer and better than ever, but he couldn't sell them even at ten cents per basket.

Martin L. Haines said the Kieffer is all right if you eat the outside one week and the inside a week later.

Thomas J. Beans thought the intrinsic value is not always to be considered, but the marketing is. Mere beauty has an intrinsic market value, and this is possessed by the Kieffer. The State Horticultural Society has discussed the merits and faults of the Kieffer quite thoroughly and never indorsed it. Other societies have also had the question under consideration, showing that the variety is at fault somewhere.

He was much disappointed the past season to find that canners do not hanker after the Kieffer, although in households it was thought

to be the best pear for canning. The variety will not be of value on heavy land or further north, but on our light, sandy soil it is an excellent pear and of good flavor.

Charles Parry read a paper on the subject. He thought those who could not appreciate this pear had a depraved and vitiated taste. Never before, he said, have so many pears been raised on the river farms of Burlington and Camden counties as this year. The crop was principally Kieffer. About 150,000 baskets of this variety were marketed from that district. A feeling has risen against the Kieffer on account of the tremendous production. Nevertheless, the demand was equal to the supply at fair prices. While the sweet corn and some other crops were carted home from the city on account of no sale, the Kieffer pears were meeting ready market. They sold for from 40 cents to 75 cents per basket; the average price per basket was 25 cents in Philadelphia, and readily brought \$2 per barrel in New York. Even the croakers had to admit that Kieffer orchards were pretty good. A low average production per tree is \$2.50; at 25 cents per basket they will yield \$250 per acre.

It is not likely that the fruit crop will ever again be so large as the past season, and it is probable, therefore, that the Kieffer will sell better hereafter than ever. The pear market is increasing, and the fruit has come to stay.

S. C. Deacon said his objection to the Clapp variety is the blight.

Emmor Roberts stated he began with this variety twenty years ago. At first he was troubled with blight, but learning that coal and other gases prevented the trouble, has been spreading gas lime over the trees about every two winters since, and has experienced no further trouble.

Secretary Franklin Dye, of the State Board, emphasized the point brought out by Mr. Beans that the character of the soil affects the flavor of the fruit. The word Kieffer being pronounced two ways, Mr. Dye at this point asked if any one present knew the correct pronunciation of the word. Col. Pearson, who is a German scholar, said the word is from that language, and is pronounced Kee'-fer.

Martin L. Haines said trees will not be affected with blight if kept trimmed.

B. C. Sears, Superintendent of the College Farm, New Brunswick, spoke on "Dairy Husbandry." He has a large farm and dairy in Orange county and ships to New York.

He said: "The dairy interest of the United States is of enormous proportions. According to the figures taken in 1888 there were 14,856,414 cows in the United States. In New York State alone four hundred millions of dollars were invested in the dairy business at that time. In New Jersey there were 185,328 cows, valued at \$34 each on an average. About fifty millions of dollars is wrapped up in this State's dairy interests. With such vast sums at stake it is important that the business be given careful consideration.

"The average yield of a cow has been found to be 1,300 quarts annually. I have had cows which produced 3,000 quarts by careful attention. From this it can be judged how much chance for increase there is from the average, and with but little increase in expense and with no increased capital.

"The one redeeming feature about the dairy business is that the income does not come all at once but all through the year. Manufacturers, it is noticed, buy all the latest and most improved appliances for their business. They cannot succeed otherwise. So it should be with the dairyman. He must be careful to get good stock and then keep up the breed. His barns and appliances should be in first-class condition.

"The experiments at the College Farm show that certain cows are the best milk producers, namely, a cross between Ayrshire and Jersey. I feed hay, wheat bran, corn meal and brewers' grains with good results. The milk costs me, on the farm, two cents per quart. We ship altogether in glass bottles holding one quart each, using the lever stopper, such as is now used on beer bottles, and they are packed in boxes containing 20 bottles. This keeps the milk purer, sweeter and longer than in cans. It has greatly increased the sale of milk in that city, so that now 1,000,000 quarts are delivered daily. The bottles are iced on real warm days in summer. We run the risk on the bottles and get most of them back, but we lose considerable. At the present time the wholesale price at home or shipping station for New York market for milk in cans is $3\frac{1}{2}$ cents, and that would be equal to $4\frac{1}{2}$ cents in New York, as the freight is 1 cent per quart from Orange to New York. This is liquid measure, however, making the price greater than it is in South Jersey, where it is sold by dry measure."

Joseph Engle, Jr., said the Philadelphia dealers had threatened to bring a car-load of milk from New York this week, but from the figures given they could not undersell the Jersey farmer.

"The Farmer in Politics" was the subject of a paper by Linton Satterthwait, of Trenton, who said there was no place in politics as they now are for the farmer, professional man, business man or laborer. He said: "It is right for any industry to ask for class legislation, if, in any way, it benefits the public; otherwise, it is wrong. The Farmers' Alliance was doomed from the beginning for this reason. A political party founded on class principles cannot succeed. Farmers' organizations are excellent to work reform in old parties, but not to start a new one. There is too much corruption in politics at the present time, and unless it is stopped the public is doomed. The demagoguery leadership is bringing disastrous results. No leader should be followed until he has shown some ability to lead.

"Freight discrimination is at present of more importance to the farmer than the tariff. Unnecessary expense of the government is also of importance and should be looked after. Farmers are drained by taxes which go to politicians who are not fit to fill any position of importance. In this State the people have lost the power of self-government. Men of no capability or character are often elected and the public does not seem to care. Men whom you would not trust in trifling business affairs you elect to high political positions.

"Positive fitness should be the object in selecting candidates. Of course such men will not seek nomination or election; the people should attend to this. The expenses incident to the election should be borne by the party.

"The flagrant use of money in politics is appalling. For the past fifteen years there has not been an election in New Jersey that we would not be ashamed of. The Ballot law now in vogue will not stop the corruption, although it will assist to do it."

Farmers have a duty to perform in politics, but that duty must be done as citizens and not as farmers only. The farmers were destined to be the bodyguard of the country. They are quicker to recognize needed measures and to devise remedies for effectual legislation, but at the same time they must remember that the changes are made by public opinion, and it is for them to see that the channel of popular sentiment is directed in the way that will produce purer politics. The Eastern farmers have themselves to thank for the state of affairs that brings the product of the Western agriculturist to their very doors. A farmers' political party is an impossibility, but a farmers' organization in the interest of good government is a necessity. The

farmers are the bodyguard of the Republic. Farmers should be governed by reason, not by prejudice. It takes more brains to conduct a farm successfully than to distribute all the patronage of the State. Freight discrimination is of more importance to the farmers than the tariff. Our public guardians are, as a rule, a failure. Incompetent men get in politics and draw big salaries. Our officials should be brought in touch with the intelligence and virtue of the citizens. The tax consumers are now growing rich; the taxpayers poor. The people of this State have lost the power of self-government. The people seem to think they have no constitutional rights. The man seeks the office, not the office the man. Under our system the most incompetent men are elected to office and made our rulers. Mere popularity should not be mistaken for ability. Try and select good men for officers. We must change our ways or our government is lost. Our new Ballot law has not remedied the evil. Bribery still exists, and will unless there is a radical change, and a return to the Australian Ballot law pure and simple. No candidate should be compelled to spend his money to be elected. Those who advocate his election should meet that expense. The spoils system has given rise to slavish servility and boss rule. Civil service corrupts politics more than politics corrupts the civil service. Our spoilsmen have little to fear from a press that is supported with public money each year for the publication of the laws. When the publication of the laws is abolished in the newspapers the latter will be more independent and better in every way. Our United States Senators should be elected by the popular vote instead of the present method. In the light of experience the people of this State need have no fear of deterioration in the character of their Senators by changing the mode of their election. Now I propose to show the evils of caucus rule in our State government. It is a sort of political juggernaut, crushing under its wheels all who have the strength of character to disapprove its rule.

By caucus rule a corrupt minority may dictate the legislation for our State. The sway of the caucus is becoming more and more despotic. A man should enter a caucus a free man, and leave it a free man. There should be nothing coercive about it.

"How Organization has Added to the Profits of Our Milk Producers," was the question assigned to Dr. W. C. Parry, who said that

organization had already proved to be of advantage, as the price of milk has been advanced and the dairymen banded together for mutual protection. It is absurd that the farmers should have been carrying on business so long without having a word to say as to what the price should be.

People said organization wouldn't amount to anything, as the farmers wouldn't stick together, but the contrary has been proven. The dealers object to the farmers sending their milk to the agent in Camden, but it is only protection for the farmers. If the milk is received in good shape by the agent it cannot be sent back four days later as sour by the dealer who hitherto has had things his own way. The farmers are now in earnest. They will not yield to the demands of the dealers, but will stand firm. Last year the farmers were robbed of \$150,000 by the reduction of half a cent a quart in the price of milk. Add to this the losses from sour milk and selling to irresponsible parties and the amount is heavy. The agent of the association at Camden will save the farmers at least \$60,000 per annum.

George H. Harker, of Wrightstown, said that after a good deal of trouble an organization has been formed which has already secured an advance in the price. The milk dealers tried to break the influence of the organization by advancing the price before being asked to, but the farmers are not to be fooled. I can give you numerous instances of the advantage of this organization to the farmers. Last Tuesday the dealers were offering milk at Camden at four cents merely as a bluff, but they are not doing it to-day, and the very worst kickers, who swore they wouldn't take milk from the agent, have come right round and are paying $4\frac{1}{2}$ cents and taking milk from the agent as well. This is the result of organization.

Henry C. Lippincott coincided with the remarks of the last speaker and cited the case of a man who belonged to an association over in Pennsylvania who concluded to leave it, and sell his own milk. It cost him \$300, and now he says he will stick to the association. Our organization is a power and the dealers recognize it. I believe in fair prices and I am here to stand by the Dairymen's Association of Burlington county.

A resolution indorsing the act of the Dairymen's Association and urging them to continue their course was offered. Horace B. Lippincott referred to the success of the association, and regretted that there were some farmers who should stand aloof and do nothing to help the men who are working for the interests of every farmer.

Dr. W. C. Parry said it should be to the interest of every farmer to stand by the association, and lend it his aid and assistance. It cannot fail now, but it should be thoroughly backed up by every milk producer. This means a benefit to all and hurt to none.

The following resolutions were then passed :

“ Resolved, That this Board indorse the action of the New Jersey Milk Association, and urge them to continue their course in regulating the price of milk and improving the condition of the milk producer.”

“ Resolved, That a committee of five be appointed to bring before the State Board of Agriculture the subject of having appointed a State Inspector, who shall have authority to certify for the State the healthfulness of herds of milk-producing cattle in the State.”

George Harker, Dr. W. C. Parry, Thos. J. Beans, Edmund Cook and H. I. Budd were appointed that committee.

THE RATIONAL USE OF MANURES.

BY PROF. E. B. VOORHEES, NEW BRUNSWICK.

The primary aim of every farmer is to raise profitable crops. The secondary is to at the same time maintain and even increase fertility. At the present time, when prices are low, gains must be made by decreasing cost of production ; therefore, the rational use of manures is a consideration of prime importance.

That the use of manures has not always been rational is abundantly proven by the failures of many theories that have been tried for the improvement of land, because they were unreasonable and not founded upon scientific facts. We are not as yet possessed of all the facts. Problems are daily presented that defy solution by all the known facts of agricultural science. Nevertheless, there are a few fundamental principles which do apply to all the varying conditions of season, soil and crops, and which must be known, in order that we may obtain profitable crops and increased fertility.

The elements necessary, and which all soils contain more or less of, are chiefly phosphoric acid and potash, lime and nitrogen. The average analysis of good soils shows 0.35 per cent. potash, 0.20 per cent. phosphoric acid and 0.15 per cent. nitrogen. This composition, applied to the average weight of soils, shows that one acre would

contain 17,500 pounds of potash, 10,000 pounds of phosphoric acid and 7,500 pounds of nitrogen, or sufficient potash to grow 1,094 crops of wheat, 20 bushels per acre; sufficient phosphoric acid to grow 800 crops, and sufficient nitrogen to grow 234 crops. They are the farmer's capital stock, and they are what he buys when he purchases land. The application of lime and commercial fertilizers to these well-tilled humus soils insures profitable returns. All animal refuse of whatever description and wastes of the farmer should be applied to the soil, in that they furnish organic matter which serves to render the soil more open and porous, and able to retain more moisture and valuable constituents and prevent their passage into the drains. It may be observed that while it was possible to get over 1,000 crops of wheat from a rich soil, there was only sufficient nitrogen for 234, and phosphoric acid for but 800. Rotation of crops may in a measure balance these inequalities, but it has been proven that the element present in *smallest proportion* measures the crop-producing power of any soil. Therefore, complete commercial manures do not economically furnish in all cases the necessary ingredients.

In too many cases one or two elements are producing the increase, while the others are added to a surplus already existing. One element in one section, another element in another, have produced profitable crops, while the application of a complete fertilizer did not return the cost, yet the fertilizer was worth the money paid for it in the market.

In other words, the capacity of a soil should be understood; if deficient in nitrogen for any crop, furnish nitrogen only; if deficient in potash, furnish potash only; if deficient in phosphoric acid, only furnish phosphoric acid. For intensive farming, in truck-raising, can crops vary in their capacity for using different kinds of elements, or do certain crops, growing under conditions which demand an application of all the elements, require a greater proportion of one than of another? The answer is yes. For instance, potatoes and corn require for their full and rapid development an abundance of readily-available phosphoric acid and potash; wheat and oats, phosphoric acid and nitrogen; tomatoes, cabbage and asparagus, nitrogen and potash; turnips, phosphoric acid; clover and leguminous crops in general, phosphoric acid and potash; the grasses, nitrogen and potash, and so forth. That is, while all elements may be needed,

those specified are specially useful and should be applied in greater proportion. For instance, corn, while it gets all of its nitrogen from the soil, grows during the hot season, when the conditions are most favorable for the development of nitrogen, and therefore can reach full development in soils of average fertility, while wheat, developing most rapidly in the early summer, requires readily-available supplies of nitrogen. These are not formed in the soil at the season, hence must be supplied. Thus it is readily seen that there is reason in recommendations of this kind; it is not theory, it is fact, and if properly followed will lead to economy in the use of plant-food which has a direct influence in cheapening production.

In the consideration of this subject there is a point that is of frequent inquiry by farmers, viz., how much shall be applied? This is a question of importance, especially in regard to the element nitrogen, which is the most expensive and at the same time most elusive. Phosphoric acid and potash if not removed by the crops of one season remain for another, though perhaps in less readily-available forms, while nitrogen has a tendency to steal away into the drains if not taken up and used by the plant.

Is there, then, any safe guide as to quantity that should be applied? To this I would answer that for readily-available nitrogen, yes; while with the mineral elements it is not so easy to give a positive answer. For instance, if it is positively known that the average yield of wheat per acre cannot go above 12 bushels in an average season, and that the nitrogen in the 12 bushels, with the accompanying straw, is 12 pounds, will that amount be sufficient to guarantee that increase under average conditions? The answer to this is no; for, in addition to the amount that goes into the grain and straw, there is a certain amount that goes into the roots, another portion is perhaps placed out of the reach of the roots, and still another, perhaps, that passes into the drains, so that it will be necessary to add more than just sufficient to produce the desired increase. All experiments and investigations upon this subject indicate that on the average but two-thirds of the nitrogen added is secured by the crops, even under the best conditions, so that instead of adding 12 pounds we should add 18. Of course, if the conditions are unfavorable, the results might be far less than was expected, still, this is a guide, and furnishes us a reasonable and economical basis upon which to work. It prevents wasting by over-supply, and disappointment from an insufficient supply. I know of

a farmer who, in his fertilizer for wheat, on a soil that manifestly needed nitrogen, applied that element at the rate of $1\frac{1}{2}$ pounds per acre, and, because it did not give him a profitable return, condemned not only the manufacturer of it but fertilizers in general and all who had to do with them, the Experiment Station included. The fault did not lie with the manufacturer or the fertilizer, nor even with the Station, but with him. Another said it did not pay to apply nitrogen to wheat, for, though he got an increase in crop, it did not pay : the trouble was that he added 350 pounds of sulphate of ammonia per acre, or 70 pounds of actual nitrogen, which cost him \$12, and which produced 10 bushels of wheat at ninety cents per bushel. His bushel of wheat might, and it is extremely likely that it would have been produced with less than 20 pounds of nitrogen, which would have cost him less than \$3.50, thus leaving him a handsome profit. So, it seems to me, that even here the reasonable use of nitrogen, of fertilizers, is worthy of careful thought.

J. M. Dalrymple, of Hopewell, N. J., in "Neglected Items of Farm Profit," gave a carefully-written paper containing many instructive points.

Good farming embraces tidiness and neatness, and they do not unfit the farmer, but actually help him in the growing of grain, fruit, vegetables, and the rearing of stock. At odd times the pruning of a tree, the training of a vine, repairs to a fence, the grading of the lawn, cleaning of a water-course, will add much to his comfort, profit and pleasure.

Stop all unnecessary expenses, buy and sell for cash, raise the best of everything, and seek a home market. Seek to form a home. Bring up your sons to be independent. Interest them by giving them a colt to raise, a corner of the farm from which to obtain their own spending-money. Give your children a good education, but be careful that they shall retain their common sense by preferring the farm to menial work in the cities. In every farm-house there should be a bath-room and tub.

Farmers should keep full and correct accounts with their farms at all times, know what they are doing, where the profit and loss lie, and thus be able to leave out the crops from which loss follows. Follow some well-defined plan of action until the result desired is accomplished ; do not hesitate, but jump in and scramble through as

well as you can. Life is too short for any but quick and earnest action.

Do not attempt too much land with limited capital. Take excellent care of your machinery and place it in perfect order at your leisure moments; do not leave it until you need to use it. Stop the holes in your barn-yard, allow none of your manure to run to waste. An observing farmer said he thought on an average farm of 100 acres from \$300 to \$500 annually ran to waste in carelessness about little things.

Subdue all kinds of weeds in fence corners and elsewhere. It will pay to build cheap gates, to paint the house and barns, to supply your wife with all the labor-saving machinery, to furnish your table with the leading papers and periodicals of the day, to plant plenty of fruit, to combine with your neighbors in organization for mutual benefit and protection.

Quite a general discussion then ensued upon the increase of our county and township taxes, and the waste of our Freeholders and tramp treatment.

Horace B. Lippincott read an able paper, showing individual instances how the heeler politicians managed the votes to the defeat of capable candidates and the robbing of the taxpayers.

Samuel H. Chambers cited some practices whereby the taxpayers were annually robbed of large sums, and said our taxes would only increase until measures were taken to arrest their progress. He said the cost of our tramps was so great that it would pay us better to board them at first-class hotels; their expense this year for commitment and board, at present rate of progress, would be \$20,000 to \$25,000 for the year. Bridges of all kinds were rebuilt simply to make money for the Freeholders. No vouchers were ever rendered for work done. Accounts were presented before the Board, insufficient time given for their examination and passed without even more than a knowledge of their heading and footing. In every direction there seemed to be a desire not to save but get all that is possible from the public purse. Our farms will soon not be worth the holding. Already the taxes have reached from one-third to one-half the net income of many farms, and many farmers have to borrow the money to pay their taxes or suffer their farms to be sold. Mr. Brock and others spoke earnestly in the same direction, and the general expression

was that we have reached a crisis where something radical must be done to save our homes from the rapacity of our tax consumers. The following resolution was passed :

"Resolved, That a committee be appointed by the Chair to urge upon the Legislature the necessity of the passage of a bill abolishing the Board of Freeholders, and providing for the election annually of not more than five Commissioners, not more than three of whom shall be of the same political party."

Theodore B. Pope, George H. Harker, Dr. William C. Parry, Horace B. Lippincott and Frank Jones were appointed as the committee.

It was urged that there would not be the same number of hands in the treasury with five Commissioners as with twenty-seven Freeholders, the supposition being that he who holds office is bound to make all he can out of it.

Dr. Parry thought by having Commissioners they would be responsible to the people of the whole county, whereas the Freeholder is responsible only to his township. He thought, on the whole, affairs in his native county (Bucks, Pa.) had been conducted satisfactorily by the Commissioners.

Emmor Roberts was not inclined to look favorably on the resolution. He thought 27 men would give better results than 5.

R. M. Brock said the Freeholders meet too often, spent more time eating good dinners, smoking good cigars and drinking fine whiskey at the poorhouse than they did transacting the county business.

J. H. Combs, of Beverly and Nelson P. Creely, of Burlington, were appointed delegates to the New Jersey Horticultural Society, sessions to be held December 17th and 18th, at the State House, Trenton.

CLIMATIC HISTORY NEAR MOORESTOWN, N. J.

Latitude, 40°, Longitude, 74° 54'; Above Tide, 71 Feet. For Year 1891.

OBSERVER, THOS. J. BEANS.

	TEMPERATURE.			Rain and Melted Snow —Inches.	Snow—Inches.	COMPARED WITH NORMAL FOR PAST 27 YEARS.		Number of days on which 0.01 inch or more of rain fell.
	Maximum— Degrees.	Minimum— Degrees.	Mean— Degrees.			Temperature— Degrees.	Precipitation— Inches.	
January	53	16	33.90	5.07	4.5	+4.47	+1.62	12
February	68	13	37.99	5.28	2.	+6.61	+1.92	14
March	64	12	36.61	4.80	2.5	—0.89	+1.22	13
April	84	29	51.94	2.32	Trace.	+2.61	—0.59	9
May	92	33	59.26	2.33	Trace.	—1.32	—1.53	10
June	96	46	67.79	3.55	.....	—0.53	—0.27	7
July	90	54	69.64	4.61	.....	—5.12	—0.26	10
August	94.5	53	71.91	4.64	.....	—0.02	—0.02	11
September	93	47	67.94	3.33	.....	+2.68	—0.64	6
October	89	29	52.72	2.80	.....	—0.67	—0.58	8
November	70	14	42.03	2.30	.....	+0.03	—1.06	8
December	67	16	40.72	4.60	Trace.	+8.23	+1.28	7
For year .....	.....	.....	52.70	45.63	9.	+1.16	+1.65	115

Latest killing frost in spring, May 6th (temperature, 33°); earliest, October 25th (temperature, 32°), making length of season for out-of-door growth of tender vegetation 199 days.

While the rainfall for the year was 1.65 inches more than the average for past 27 years, the only marked deficiency was in May, 1.53 inches, that extended into part of June, and occurring at a critical stage in the growth of the crop of hay, reduced the yield seriously, but did no injury to other crops. The climatic peculiarity of cool, moist summers and mild winters inaugurated in 1889 has, in modified form, prevailed during the past year. The temperature of July was 5.12° below the average, as were all the summer months, which, with the frequent cloudy skies, so weakened the vitality of melon and citron vines that many became an easy prey to insect enemies, and those crops were seriously injured. The secretion of a liquid in the stalks of wheat occasioned heating in the mow, and the propagation of unusual numbers of barn, weevil and another mow enemy has done much harm, and in some instances made the entire crop unsalable for flouring purposes.

The name of the new mow enemy is the Angoumois grain moth (*Gelechia cererella*) of European origin.

BURLINGTON COUNTY AGRICULTURAL SOCIETY.

OFFICERS FOR 1892.—President, H. I. Budd; Vice President, Samuel H. Chambers; Recording Secretary, John B. Collins; Corresponding Secretary, Henry I. Budd; Treasurer, Edward B. Jones. Address of all, Mount Holly.

FINANCE COMMITTEE.—Henry C. Risdon, Edward Wills, Joseph C. Kingdon.

COUNSEL.—Joseph H. Gaskill, Mark R. Sooy.

BOARD OF DIRECTORS.—Henry I. Budd, Benjamin F. Deacon, Joseph Wills, William D. Troth, Edward B. Jones, John B. Collins, Henry Ellis, Samuel H. Chambers, William R. Lippincott, Davis C. Wells.

The forty-sixth annual fair will be held on their grounds, near Mount Holly, N. J., on September 12th, 13th, 14th, 15th, 16th and 17th, 1892.

ANNUAL MEETING.

The annual meeting of the stockholders of the Burlington County Agricultural Society was held at the Court House on Saturday. John B. Collins called the meeting to order, and Joseph H. Gaskill was elected Chairman. Mr. Collins was elected Secretary.

The report of Edward B. Jones, Treasurer, was read and adopted. It follows:

TREASURER'S REPORT

For the Year Ending January 9th, 1892.

RECEIPTS.

Balance on hand January 8th, 1891.....	\$1,357 03
Rent of grounds, buildings and chairs.....	155 08
Rent of dining and refreshment stands.....	2,354 65
Amusements.....	1,712 25
Privileges	241 00
Coat and package-room.....	49 20
Entrance fees for horses.....	4,475 10
Entrance fees for cattle, sheep and swine.....	273 81
Entrance fees for poultry.....	136 10
Admissions to grounds.....	12,645 78
Admissions to grand stand... ..	2,770 25
Crossing ring.....	72 00
Supply-wagon tickets sold.....	62 50

BURLINGTON COUNTY.

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Lunch counter.....	\$556 31
National Trotting Association.....	16 75
Materials sold.....	6 75
Notes discounted in banks.....	45,000 00
Total	<u>\$71,884 56</u>

PAYMENTS.

Repairs.....	\$305 42
Sundry fair supplies and expenses.....	207 74
Labor and teams.....	670 98
Water rent.....	45 00
State tax.....	4 00
National Trotting Association, dues.....	50 00
Rent of office.....	150 00
Postage ..	221 00
Diplomas, medals and engraving	55 12
Advertising in newspapers.....	1,800 96
Advertising by posters and flyers.....	856 38
Printing.....	1,325 43
Decorating buildings.....	103 00
Society guest and dining-room.....	202 69
Lunch counter.....	413 30
Hay, straw and fodder.....	758 45
Freight and expressage.....	106 55
Telegraphing.....	11 14
Use of steam fire-engine.....	65 00
Guards, police and detectives.....	807 00
Clerks.....	398 75
Turnstile men.....	155 50
Judges and experts.....	142 85
Salaries.....	1,100 00
Amusements.....	1,018 25
Music	225 00
Entrance fees refunded.....	50 00
Discounts.....	827 98
Notes in bank.....	46,500 00
Premiums	12,539 75
Cash balance January 9th, 1892.....	767 32
Total.....	<u>\$71,884 56</u>

INDEBTEDNESS.

Notes outstanding.....	12,500 00
Less cash in Treasurer's hands.....	767 32
	<u>\$11,732 68</u>
Decrease of debt since last report.....	910 29

EDWARD B. JONES, *Treasurer.*

The Finance Committee have examined the Treasurer's account, compared the same with the vouchers and find it correctly stated. There is a balance in the Treasurer's hands at this date (January 9th, 1892), of \$767.32.

HENRY C. RISDON,
JOS. C. KINGDON,
EDWARD WILLS.

The report of the Directors was read by Henry I. Budd, President, and is as follows :

DIRECTORS' REPORT.

Gentlemen and Stockholders of the Burlington County Agricultural Society—As our Treasurer has presented in detail the receipts and expenditures for the past year, we will not weary you with a lengthy analysis of them.

Our admissions from Philadelphia were about 3,000 in excess of last year. From fifteen to twenty per cent. smaller in some other directions.

Our receipts from admissions exceeded last year	
about.....	\$1,757 86
From dinner and refreshment stands.....	117 65
Entrance money on horses.....	1,594 35
Cattle, sheep and swine.....	273 83
Poultry entries.....	136 10
Grounds and pasture	85 08
Supply-wagon tickets.....	62 50
Other sources, about.....	100 00
	<hr/>
	\$4,127 37
Decrease from amusements.....	1,251 91
	<hr/>
Gain in receipts	\$2,875 46

Our expenses in all directions were about \$12,002.56 in excess of last year.

Our receipts from all sources, outside of notes, were \$26,884.56 ; our expenses, \$24,617.24.

Our indebtedness at last meeting.....	\$12,642 97
Our indebtedness at this meeting.....	11,732 68
	<hr/>
A decrease of	\$910 29

Which is still held in the form of temporary bank notes.

Our exhibits, with the exception of manufactured articles and farming utensils, were, with few exceptions, up to and in many instances ahead of the usual standard.

The agreement entered into by manufacturers to abstain from showing at the fall fairs of 1891, lessened the usual fine show of agricultural implements, and although they avoided much expense, we think their future sales will convince them they could have done better by showing.

Our almost herculean efforts, coupled with our fine display, excellent trotting and beautiful weather, should have, in the ordinary course of events, attracted much greater crowds.

Our advertising was more liberal than ever before. By it we no doubt arrested the downward tendency of the three preceding years, and for a time, at least, saved ourselves from the sure decline that seems to be the fate of similar county organizations.

The inclination of our people seems to be to throw aside the pride of success for their own county fair and spend their time and money at outside meetings, where doubtful practices, beer, pool privileges and gambling are licensed—these are more exciting attractions.

In the early history of agricultural fairs, farmers and others were willing to show in gentle and friendly competition, almost for the honor of slightly excelling each other. Their tastes were simple. Public amusements were few and far between; chances for social intercourse, such as large gatherings gave, were eagerly seized upon as pleasant variations to monotonous lives.

As wealth and wider knowledge of the world increased, people more and more demanded not only greater rewards for their labors in the shape of greater premiums, but more exciting amusements, generally in the form of contests of speed.

The more moral and conservative elements fought these, to them, demoralizing tendencies, and in their efforts to hold their families and neighborhoods to quiet exhibitions of their products, these old and legitimate organizations gradually drifted into oblivion for the want of support.

The country lies strewn with the wrecks of the old-fashioned fairs, and those that still survive are closing out a miserable existence, worrying their managers to raise sufficient funds to pay the small premiums offered.

Thus the proper conduct of an agricultural fair, to be both beneficial and successful, is becoming a problem difficult to solve.

Nearly all county fairs are being ground to death between the upper and nether mill-stones of morality, beer-drinking and gambling. Our religious friends denounce the latter, as well as contests for speed, and the masses will not come unless at least the last ministers to their amusement.

Exhibitors demand large premiums and will not bring their animals and articles without promise of large awards; large awards can only be given from large gate receipts, and these can only be obtained by offering many varied and even doubtful attractions.

The Directors of what was once the most successful county fair in Pennsylvania, viz., Bucks, have decided to sell their grounds and buildings to cancel their indebtedness.

Their honored President, Eastburn Reeder, says in his address to the stockholders: "A strictly moral fair without beer and gambling, will not pay in our county." Conversely he should have said that no strictly moral fair can succeed alongside of those that license these practices. Simple amusements and attractions no longer please the masses, and he who wins the favor of those who seek enjoyment, must minister to many of their pleasures.

The moral of these remarks is, that sentiment and law should prevent every such practice or allow all organizations similar liberties.

We have invested over \$100,000 in grounds and buildings where art and industry can each year find fitting space for healthful and beneficial competition.

To maintain these intact and meet our obligations in the face of the most vigorous near-by competition from the most enterprising fair management on the face of this continent, will require the almost continuous watchfulness and labor of the best energy and talent you can place in your future board of management.

CAMDEN COUNTY.

CAMDEN COUNTY BOARD OF AGRICULTURE.

The Camden County Board of Agriculture have held two meetings since the last annual report. The regular annual meeting held at the Town Hall, Haddonfield, November 24th, 1891, was chiefly occupied with the election of officers, with the following result:

<i>President</i>	ISAAC W. NICHOLSON.....	Camden.
<i>Vice President</i>	GEO. T. HAINES.....	Haddonfield.
<i>Secretary</i>	JOHN HUTCHINSON	Haddonfield.
<i>Treasurer</i>	NATHANIEL BARTON.....	Mt. Ephraim.

DELEGATE TO STATE BOARD FOR TWO YEARS.

EDWARD T. HUSTON.....	Haddonfield.
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DIRECTORS.—Rudolphus Bingham, Hamilton Haines, Amos Ebert, George T. Haines and Samuel Wood.

ANNUAL REPORT.

BY JOHN HUTCHINSON.

A special meeting of the Camden County Board was held at Town Hall, Merchantville, December 15th, 1891.

A valuable and copious paper on "The Utility and Importance of Our Insectivorous Birds: How are We to Protect Them, and How are We to Get Rid of the European Sparrow?" prepared by Samuel N. Rhoads, was read by the Secretary.

General remarks and discussion followed, and the opinion was freely expressed that if more attention was given this important subject there would be less need of spraying trees and the many other

efforts that farmers and fruit-growers are compelled to put forth to defend their crops from the innumerable insect enemies.

The practice of killing birds for millinery purposes was strongly condemned, and the fact that many of our birds distinguished for brilliancy of plumage are almost extinct, was freely admitted.

The urgent need of rigid legislation was the unanimous opinion of all the members present.

The European sparrow that has become so numerous in all parts of the country, claimed a share of attention, and the habits of these birds in feeding almost entirely upon seeds, and with their quarrelsome disposition and efforts to drive other more valuable birds away, seem to demand energetic measures for their suppression.

AFTERNOON SESSION.

The following preamble and resolutions were unanimously adopted :

“**WHEREAS**, The demand of rural and suburban residents for early and reliable reports of markets, business and social purposes renders the increase of postal facilities imperative; *and whereas*, the daily journey of rural and suburban residents to the post-office is an onerous duty and a tax upon their time and energies that should be removed as soon as possible; therefore,

“*Resolved*, That we demand the extension of the free delivery of letters and postal facilities to the rural districts by mounted letter-carriers or otherwise.

“*Resolved*, That the Secretary be and he is hereby instructed to communicate our views to our member of Congress, and request his efforts towards accomplishing the result desired.”

A comprehensive and lucid address on the “Sources and Uses of Manure” was delivered by Prof. Voorhees, of the State Experiment Station, which received a unanimous vote of thanks from the members, who were much pleased with the treatment of the subject.

Next followed remarks by B. C. Sears, of the State Experimental Farm, on “Feeds in their Relation to the Milk and Butter Product,” which were fully appreciated by the Board, who voted a resolution of thanks to the speaker.

These remarks brought forth an interesting discussion on the various feeds in the market, their commercial value compared with their practical value in the animal economy, and the importance of

CAMDEN COUNTY.

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combining the right proportion to insure profitable results. The great value of milk as an article of food claimed a share of the remarks, which were of great interest to farmers and others.

The next subject which claimed the attention of the Board was the "Construction and Care of Public Roads," introduced by Clayton Conrow, of Burlington county. He strongly urged a radical change in the manner of both building and repairing them; that the burden of supporting the public highways should be largely carried by the State, and not by the townships. That this is the proper plan was illustrated by the history of all the great public highways the world over, and that these have been constructed by competent engineers, which should be the case now.

After further interesting remarks the following resolutions were unanimously adopted, to wit:

"Resolved, That the Camden County Board of Agriculture, in special meeting assembled, unanimously indorse the road legislation of last winter, by which the control of the roads was placed in the hands of the Township Committees; and further

"Resolved, That the Secretary be, and he is hereby directed to send a copy of these resolutions to the members of Assembly from our county."

CUMBERLAND COUNTY.

CUMBERLAND COUNTY BOARD OF AGRICULTURE.

President.....THOMAS E. HUNT.....Greenwich.
Secretary.....W. O. GARRISON.....Bridgeton.
Treasurer.....T. F. D. BAKER.....Bridgeton.

DELEGATES TO STATE BOARD.

W. O. GARRISON, term expires 1893; B. F. SHARP, term expires 1892.

ANNUAL REPORT.

BY W. O. GARRISON.

Cumberland county farmers have just come through a season of magnificent crops of fruit and vegetables, but, unfortunately for them, all other farmers seem to have been blessed in the same way. The result was the complete demoralization of the markets and an overturning of all our ideas of values. Apples averaged but little over ten cents per basket and peaches twenty. Watermelons would not sell for enough to pay freights. Muskmelons were no better. Sweet potatoes were offered at seventy-five cents per barrel without buyers, and Irish potatoes at the same price.

Price failure is worse than crop failure, and in those parts of our county where little or no grain and hay are produced, the agricultural classes are feeling the pinch of hard times worse than for many years. Corn, wheat and hay have made good crops, and prices have been well maintained.

There is general complaint that the number of farm laborers is decreasing, and that the average of their intelligence and morality is getting lower. Wages, as reported to me, average \$15 to \$20 per month, with board, or \$20 to \$28 per month without board.

Spraying fruit trees and vines is making substantial progress. Experiments in this line are carefully watched, and as the system proves practicable and profitable, it will be in general use.

The tomato crop, which has been growing in importance year by year, was not as large as usual. The vines, stimulated with too much free nitrogen, grew with great luxuriance, but bore little fruit. The writer's attention was called to a field that a few years ago produced sixteen tons per acre. This year, though the vines were from eight to twelve feet in length, and completely covered the ground, the crop was less than three tons.

The various farmers' organizations are in a fairly prosperous condition. The Agricultural and Horticultural Society has purchased larger grounds in a more elevated location. The fair held in August was probably the best and most profitable in the history of the society. There are a few Granges in the county holding regular meetings and keeping up an interest in their work of elevating rural life. Several have been allowed to go down through the apathy of the members.

The Alliance has made considerable progress, and now has a branch in nearly every neighborhood.

These organizations have a wide field of usefulness before them, a field in which they have already accomplished much.

Our County Board of Agriculture has done little more than keep up its organization through the busy months.

The Farmers' Institute, held under its auspices January 13th and 14th, was well attended and profitable. Mr. Adam Graff gave an eminently practical address on "Grass," Prof. E. J. Hitchner on "Our Boys and Girls the Future Farmers."

Hon. Franklin Dye opened the Thursday morning session with an address on "Diversified Farming." Mr. Elwood Evans followed with a carefully-prepared paper on "The Silo."

Mr. Dalrymple opened the afternoon session with an address on "Farm Wastes; Stop the Leaks."

All the subjects presented awakened keen interest, and each address was followed by a period of discussion and conference.

Cumberland county had the honor two years ago of holding the first Farmers' Institute in New Jersey.

Our County Board, starting, as it did, in the van, does not wish to be left to bring up the rear in the great procession.

ESSEX COUNTY.

ESSEX COUNTY BOARD OF AGRICULTURE.

OFFICERS OF THE BOARD.

<i>President</i>	I. S. CRANE.....	Livingston.
<i>Vice President</i>	M. H. CANFIELD.....	Caldwell.
<i>Treasurer</i>	A. E. HEDDEN.....	Verona.
<i>Secretary</i>	J. H. M. COOK.....	Caldwell.

BOARD OF DIRECTORS.

C. B. CRANE.....	Caldwell.
R. C. CAMPBELL.....	Caldwell.
F. C. GOBLE.....	Verona.
WM. DEICKS, SR.....	Livingston.
A. W. HARRISON.....	Livingston.

DIRECTOR TO STATE BOARD.

A. W. HARRISON (for two years).....	Livingston.
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ANNUAL REPORT.

The past year will be remembered as a prosperous one for the Essex farmer. The blessings of a kind Providence, without which all labor is in vain, have been granted in "good measure, pressed down, shaken together and running over." The heart of the devout husbandman is filled with gratitude to the Giver of all good for another fulfillment of the promise that "Seed-time and harvest shall not fail."

The very favorable weather the past season has enabled us to push the operations of the farm and utilize time and labor to far better advantage than we have been able to do for several years past. The

timely and moderate rainfalls have secured us against either drouth or flood. Atmospheric conditions were in the main favorable to plant-growth, and a generous response from the soil has been the reward of the intelligent and industrious farmer.

Although our markets have been glutted and prices ruled low for most of our products, yet the abundant yield has compensated for the reduced value, and especially for those who have the advantage of a retail market, "thus securing the highest prices," farming has been fairly remunerative.

It is encouraging to note a growing desire for a more thorough knowledge of the science of agriculture, and the theories and methods advocated in our State College and Experiment Station are studied and scrutinized with more interest than formerly. Farmers as a class are giving more attention to the details of their business and working to better advantage. They are discarding such crops as experience has taught them cannot be grown with a profit, and giving more attention to the culture of small fruits and market-gardening.

The production of milk still holds its place as the leading agricultural industry of Essex county, and the most of it is conveyed from the farm direct to the consumer. The retail milk wagon is now considered an essential adjunct to our dairy farms.

There has been more interest manifested in the work of our County Board of late. Besides the regular meetings we had an Institute at the Public School Hall in Livingston, December 4th. The day proved stormy, preventing a large attendance. But those present were much interested, and an earnest and enthusiastic discussion of the programme was enjoyed by all. After the opening remarks of the Chairman, I. S. Crane, Mr. B. C. Sears, Superintendent of the State Farm, was introduced and spoke upon the "Care and Feed of Milk Cows." His remarks were very instructive and practical, and the discussion which they elicited very interesting. Mr. C. B. Crane, of Caldwell, then favored us with an able address upon "Best Method of Drainage and to What Extent Does it Pay." (See paper following this report.) Mr. Wm. R. Ward spoke upon "Hints for Future Use in Farming, as Suggested by Experience and Observation."

Evening session opened at 7 o'clock. Secretary Dye, of Trenton, was first called upon and spoke of the importance of our County Board work and the influence farmers were able to exert through it and kindred organizations.

Prof. Halsted then spoke upon the subject "Fungi Injurious to Plant Growth."

An agricultural exhibition was held at Caldwell September 30th and October 1st, under the auspices of Caldwell Grange, which was a decided success. There was a fine display of fruits, vegetables, flowers, household productions and fancy work, and the extent of the fair seemed to be limited only by the capacity of the buildings. The display of fruit and vegetables was very fine and proved that Essex is not surpassed in quality of its productions by anything in the State. The display made by J. W. De Bawn, O. E. Freeman, and from the Penitentiary Farm, were worthy of special mention.

The success of a local effort of this character is evidence that the people of this county would sustain an agricultural fair of greater magnitude, and it is hoped that our County Board may hereafter possess sufficient enterprise and ambition to supply this evident want.

Our florists and our bee-keepers continue to sweeten us and our adjacent cities with their delicious products. Mr. Goble's report of the hot-house industry is given below.

The demand for honey is increasing, and as its healthfulness comes to be appreciated we hope more of our farmers will feel the importance of keeping at least a few bees to gather up and store enough of the floral fragrance to supply themselves with this useful sweet. If any one wishes to engage in bee-keeping we will give, free of charge, all the necessary instructions, and furnish everything essential to successful *scientific bee-culture* if they will call upon us at 78 Barclay street, New York City, room 4, upstairs.

The improvement of roads has received more than ordinary attention in this county the past year, and some townships are appropriating large sums of money for building stone roads. Caldwell township made a special appropriation of \$10,000 for stone roads, which necessitated a tax three times the usual amount of road tax, and this enormous increase of tax has proved a considerable burden upon those farmers who depend upon the resources of their farms for their support, and many think that such expensive roads are a luxury that is too costly for the ordinary farmer.

The plan of drainage for the Passaic valley which was adopted by the Board of Geological Survey, and so ardently advocated by the late Dr. Geo. H. Cook, State Geologist, is still in progress; but the progress of the work is so slow that no relief has as yet been received.

ESSEX COUNTY.

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And it is evident that the mantle of public spirit and enterprise which was so characteristic of its projector has not fallen upon the present Drainage Commission, and a widespread feeling of impatience among the land-owners is evident, which sometimes finds expression in a sharp criticism of the motives of those now entrusted with the work. But it is to be hoped that the developments of another year will be such as to give some practical relief, and thus prove beyond a doubt the wisdom of the enterprise.

OUR WANTS.

We want equal representation as well as equal taxation. Since the late gerrymander of our County Board of Freeholders, the farming townships of this county are totally deprived of representation in the county government, and we want this piece of political trickery rectified.

We want equal taxation, viz., that the capitalist who receives interest for his mortgage should pay the tax upon that mortgage, and that the farmer who pays the interest be relieved of such tax.

We want a lower rate of interest. The legal rate, 6 per cent., is more than money can earn when invested in farm property, especially at the high valuation of Essex county.

We want an open market to buy and sell in, that is, "reciprocity with all the world," so that farmers can exchange their products with the rest of the world without being taxed for so doing.

And if our State Board can aid us to secure these wants they will greatly oblige the farmers of Essex.

REPORT BY MR. F. C. GOBLE, FLORIST, OF VERONA,
ESSEX COUNTY.

Since my last report there have been no extensive changes either in modes of culture, buildings or plants grown in this county. There seems to be a slight falling off in the demand for the old favorite coleus that was so popular a few years since, which I attribute to the extreme lateness of our springs and early frosts in the fall. The plant being very sensitive to cold, suffers if planted out too early in

the spring, and the first cold spell in the fall causes it to shed so many leaves that its appearance is anything but attractive.

The trade in bedding and pot plants last spring was somewhat of an improvement over previous years.

The chrysanthemum craze seems to have about reached its zenith, if size is any criterion by which to judge. Think of it for a moment, blossoms from nine to eleven inches in diameter worn as corsage bouquets by our wives and sisters! Surely, they would look as handsome with a sunflower of like dimensions. However, there seems to be less demand for them the past season than heretofore, at least among "The 400." There were too many grown. This brought the price down so that the servants of the house could afford to wear as fine "mums" as the lady of the house, and of course this will never do.

More and more each year do growers confine themselves to one or two varieties of plants, and bend all their energies to get the most from their favorites, be it rose, carnation or violet.

The growth of vegetables under glass by artificial heat still advances each year. It is a slow but healthy growth. The demand for hot-house products is limited to people of wealth, therefore the prices are remunerative enough to tempt our growers to build houses for this especial purpose.

FARM DRAINAGE.

BY C. B. CRANE, ESQ.

ITS BENEFITS, METHODS, COST AND PROFITS.

Drainage may be defined as the removal of the surface-water which is injurious to the growth of plants.

In order to fully understand how drainage increases the growth of plants it may be said, first, plants need that condition of soil which will allow air, moisture and heat to enter the ground and be taken up by their roots. Where the land is full of water and remains so much of the time the air and rain cannot perform their mission to the plant. Second, soil when carefully examined is found to consist of particles of various shapes and sizes, very irregular in form, from stones and

pebbles down to the finest powder. Because of this irregularity in shape they do not lie so close to each other as to prevent air-passages between them, which causes the soil to be more or less porous. A minute examination of these particles shows that they also, like the mass of soil, are porous; very small holes being found in them, which absorb and retain moisture. In a well-drained soil the spaces between the particles are filled with air and the finer spaces in the particles with water. A sponge full of moisture but with the water pressed out of its larger spaces, *well* illustrates the mechanical condition of a drained soil. In wet land these spaces that should contain air are filled with water; and while a sufficient amount of moisture is necessary, yet the plants desirable to have grown upon a farm are in one respect like the farmer—neither of them can thrive with wet feet.

When a spring or summer rain falls upon a drained soil, the land receives valuable elements of fertility; carbonic acid, nitrogen and warmth are taken into the soil and absorbed by the roots of plants.

These in considerable quantities the plants get from the air, and as the barn-yard manure or chemical fertilizers applied to the soil must be made available to the plants through the agency of air, moisture and warmth, it is evident that the way must be clear for them to act, or the elements of fertility are largely wasted. If the soil is already saturated with water it has no room for the rain that falls, and the fertilizer that is not washed away must be long delayed in its action upon the plants.

It has been proved that a single acre of soil a foot deep, holds at a wet season a *surplus* of more than two thousand barrels of water, which if discharged would leave the land moderately moist and right for vegetation.

SOURCES OF WATER IN THE SOIL.

The rain that comes *direct* from the clouds is what the farmer needs; and hence his land should be ready to receive it—but there are other sources to contend with, and to get rid of. Springs break out where they are not desired, chill and saturate the soil; this water we do not want, it has already performed its mission where it fell, and the same may be said of the water that oozes through the soil from the higher land.

The overflow from the higher surface may be and is desirable if the lower land is in condition to receive and hold the fertilizers that this

water takes up and brings with it. Water is removed from the soil by gravitation and evaporation; and gravitation or drainage seems to be a necessity in a very large portion of our soils if we would get the best results from our farms.

Any land which, for whatever cause, whether underlaid with clay or hardpan, filled with springs or water flowing from higher land, does not drain naturally, and allow the air to enter freely between the particles of soil, needs draining, and such land has its own signals of distress, which to the eye of an observing farmer are plainly seen in the color of the land, and the crop, or the failure of a crop, and in the baking and cracking of clay soils, which are calling for air and moisture.

In response to these signals the farmer should come to the rescue by opening ditches at least three feet deep, where the fall will allow it, and from 40 to 60 feet apart, according to the character of the soil; and having secured a uniform grade as nearly as possible and a good outlet for the water, let him put in good tile drains in a proper manner, and the law of gravitation will come to his aid, slowly at first, but surely relieving the land of its burden of surplus water, and allowing it to breathe again as the air comes in and circulates among the particles of the soil, making available to the plants fertility; the rain will follow the air down into the soil, its particles absorb its elements of fertility and the sign of distress is changed to one of health and vigor. We must make the ground more porous by removing the water and letting in the air to follow its tracks downward, mellowing the soil and thus allowing the plant-roots to follow the rain courses in their search for food. And the oxygen of the air helps to decompose decayed roots for the coming roots to feed upon.

According to Dr. Dalton, of England, the annual deposit of dew there is about five inches, or about one-fifth of the annual rainfall, and a mellow, porous soil is essential to absorb and retain it.

Says Mr. Waring, in his book on "Drainage for Profit and Health," from which much in this paper has been drawn, "It has been estimated that a drained soil has room between its particles for about one-quarter of its bulk of water—four inches of drained soil containing free spaces enough for one inch of water or rainfall in depth, or four feet of such soil can receive one foot of rain, more than is known to have ever fallen in 24 hours since the deluge, and over one-quarter of the annual rainfall of the United States.

“Drained soil is much warmer, at least ten degrees, than undrained at a depth of seven inches, as proved by experiment, a difference which greatly increases plant growth.”

EVAPORATION.

Evaporation is a slow and chilling process for the removal of water. It has been found by experiments made in England, that the average evaporation from wet soils is equal to a depth of two inches per month from May to August, inclusive; in this country it is probably much greater during the summer. It is estimated that two inches of water over an acre of land would weigh about 200 tons. The amount of heat required to evaporate this is immense, and a very large part of it is taken from the soil, which thereby becomes cooler and less favorable for rapid growth. It is usual to speak of such lands heavy and wet, as “cold,” and it is easy to see why they are so.

The difference in temperature between a drained soil and one in which the water was removed by evaporation has been found to be $6\frac{1}{2}$ degrees, which is equal to a difference of elevation of 1,950 feet—over one-third of a mile. It has been established by experiments that four times as much heat is required to evaporate a certain quantity of water as to raise the same quantity from the freezing to the boiling point.

Evaporation brings up matter in a clay soil, which forms a crust upon the surface, excluding the air, and to some extent making it impervious to rain and dew. For these reasons it is evident that the farmer cannot afford to trust to evaporation where drainage is necessary.

DROUGHT.

Land which suffers most from drought is greatly benefited by drainage; it enables the land to withstand drought by rendering it porous, and thus able to absorb air and moisture; and by plowing and stirring the soil, its power to resist drought is of course much increased.

Besides the moisture received from the air, a porous soil has the power to attract water from beneath it, somewhat as a moist sponge will absorb water when only a small part of it touches the water. The extent to which plants will be affected by drought depends, other things being equal, on the depth to which they send their roots, and

nothing tends so much to deep rooting as the thorough drainage of the soil. The effect of drainage is well stated in the following extract from a letter to the "Country Gentleman :"

"A simple experiment will convince any farmer that the best means of permanently deepening and mellowing the soil is by thorough drainage, to afford a ready exit for all the surplus water. Let him take in spring, while wet, a quantity of his hardest soil, such as it is almost impossible to plow in summer, such as presents a baked and brick-like character under the influence of drought, and place it in a box or barrel open at the bottom, and frequently during the season saturate it with water. He will find it gradually becoming more and more porous and pliable, holding water less and less perfectly as the experiment proceeds, and in the end it will attain a state best suited to the growth of plants from its deep, mellow character."

In regard to the methods of drainage, it may be said that where stones are very abundant and of proper size, good drains can be made with them if they are carefully laid and there is a good fall, but they require a much wider ditch than tile, and therefore are more expensive to dig.

All things considered, tile makes the cheapest and most permanent drain, if the work is properly done. The essentials for success are a good outlet for the water, sufficient fall, an even grade, so that the water may have a continuous flow, and the careful laying and covering of the tile. The main drains that are to receive the water from the side or lateral drains, should have two-inch tiling, or even larger may be necessary in long drains, while $1\frac{1}{2}$ tiling is sufficient for most of the lateral drains. As to how close the drains should be the character of the land must determine; in heavy clay-soil 30 feet apart would be none to close. They should be at least 3 feet deep and so laid and connected as to secure the most fall, and the least number of main drains possible that will do the work. When the tiling and collars are carefully laid, making the joints fit as closely as possible, about a foot of dirt should be thrown over them, care being taken not to displace them, then this dirt should be thoroughly packed; this is very necessary to keep the fine dirt from getting into the drains with the water. After this is thoroughly done the remaining dirt may be filled in with a scraper if convenient, as it can be much more quickly done in this manner than by hand. In heavy soils especially the top of the filling should not be packed, as it will then become "puddled"

or so cemented together as to make it largely impervious to air and water for years; and this is somewhat the case in working any heavy soil while it is wet. A heavy soil will require two years or more before the water will freely find its way to the drains, and allow them to do their work perfectly.

It is desirable to have a fall of one foot to the hundred in a drain, but if the grading is very carefully done, much less will answer; 6 inches and even 3 inches to a hundred feet have been used successfully in some cases, but they are more liable to become stopped, as there is but a slight current to carry off the water and the silt which to some extent will get into the drains with the water between the joints.

The cost of opening the ditches will depend much upon the soil; from 36 to 45 cents per rod perhaps would cover the cost 3 feet deep; 1½ tiling with collars can be had, by the quantity, at about \$1.50 per hundred and two-inch tiling at somewhere about \$2 per hundred.

The cost of draining an acre of land thoroughly—ditches about 40 feet apart and 3 feet deep—will be somewhere about \$50, including filling the ditches.

WILL IT PAY?

This practical question might be answered first by asking another. Will it pay to farm land which properly drained would yield two or three times its present crop of better quality with less labor, as a dry soil is easier worked than a wet one, in the wasteful way, as regards labor and fertilizers, that is still practiced on many farms? Give the land a chance and it will quickly answer the question.

In the writer's own experience and observation, having several miles of drains to judge from in the vicinity, no improvements made upon the farm are as profitable as good drainage; it is a first requisite for good farming, and those who have tried it are continuing it wherever the land needs it.

Mr. John Johnson, of Western New York, who was one of the pioneers of tile drainage, laid over fifty miles of drains within thirty years after he began draining his land. His testimony is that tile-draining pays for itself in two years, and sometimes in one; his crops of wheat increased from ten or fifteen bushels per acre to thirty and forty per acre, after drainage. He was so well convinced that it would pay that he borrowed money to drain his land—with the best results. His opinion was, that much land that was apparently dry would pay

for draining; if a three-foot ditch was dug in what seemed dry soil and water was found in it at the expiration of eight hours, then it would speedily pay for drainage.

Many farmers can testify that two crops after drainage have paid the expense of it; and numerous instances are recorded where one alone has done it. An instance is given where a four-acre field yielded the first year after drainage forty bushels of wheat per acre—that was only fit for a wet pasture before. It is well known that wet land, even though highly manured, cannot be depended on for good crops.

A seven-acre field of low, wet land, though manured annually at the rate of twenty-five loads per acre, produced only thirty-one bushels per acre; after thorough drainage, without additional manure, the first crop was eighty-nine bushels per acre. On a four-acre field adjoining my farm, which, after being underdrained, was planted with corn, it was very easy to tell where the drains were by the size of the corn, in appearance like hills and valleys.

Much might be said of the importance of drainage for the preservation of health, but this article is already too long to speak of this, further than to give a short extract from a prominent Board of Health report on Drainage: "The excess of moisture on wet lands may be said to increase or aggravate atmospheric impurities and the evaporation of the surplus moisture lowers the temperature, produces chills, and creates or aggravates the injurious and sudden changes by which health is affected."

Drainage will enable the farmer to work his land earlier in the spring, and earlier after the land has had a soaking rain; and grass and weeds cannot so easily get ahead, and take time that is demanded for more valuable crops, and all cultivated crops are more expensively raised and less certain in results without drainage. The importance of early planting, especially with oats, makes this an important consideration.

Drained land is also much safer from frost, early or late, and it is claimed does not heave or throw out the plants as much as those not drained.

The following extract from Mr. Waring's book on Drainage gives an excellent summary of his conclusions upon this subject:

"In the practice of agriculture, which is pre-eminently an economic art, draining will be prosecuted because of the pecuniary profit which

it promises, and very properly it will not be pursued to any considerable extent where the money which it costs will not bring money in return. Yet in a larger view of the case its collateral advantages are of even greater moment than its mere profits. It is the foundation and commencement of the most intelligent farming. It opens the way for other improvements, which, without it, would produce only doubtful or temporary benefits, and it enables the farmer to so extend and enlarge his operations with fair promises of success, as to raise his occupation from a mere waiting upon the uncertain favors of nature, to an intelligent handling of her forces, for the attainment of almost certain results.

"The rude work of an unthinking farmer who scratches the surface soil with his plow, plants his seed, and trusts to chances of a greater or less return, is unmitigated drudgery, unworthy of an intelligent man; but he who investigates all the causes of success and failure in farming, and adapts every operation to the requirements of the circumstances under which he works, doing everything in his power which may tend to the production of the results which he desires, and so far as possible avoiding everything that may interfere with his success, leaving nothing to chance that can be secured, and securing all that chance may offer, is engaged in the most ennobling, the most intelligent, and the most progressive of all industrial avocations.

"In the cultivation of retentive soils, drainage is the key to all improvement, and its advantage is to be measured not simply by the effect which it directly produces in increasing production, but, in a still greater degree, by the extent to which it prepares the way for the successful application of improved processes, makes the farmer independent of weather and season, and offers freer scope to intelligence in direction of his affairs."

GLOUCESTER COUNTY.

GLOUCESTER COUNTY BOARD OF AGRICULTURE.

OFFICERS FOR 1892.

<i>President</i>	AMOS GARDINER	Mullica Hill.
<i>Vice President</i>	C. A. RULON.....	Swedesboro.
<i>Secretary</i>	THEODORE BROWN.....	Swedesboro.
<i>Treasurer</i>	D. S. ADAMS.....	Mickleton.

DIRECTORS.

DAVID BORTON.....	Mullica Hill.
D. W. SITHENS.....	Mullica Hill.
ASA ENGLE.....	Mullica Hill.
EDMUND T. RIDGWAY.....	Mullica Hill.
JAMES WHITE.....	Mullica Hill.

DIRECTORS TO STATE BOARD.

DAVID F. BROWN (two years).....	Swedesboro.
THOS. D. BROWN (one year)	Clarksboro.

ANNUAL REPORT.

BY THOS. BORTON.

There have been four meetings of the Board the past year. The regular meetings are held the first Monday in December, March, June and September. The meeting in December is the annual meeting, at which the officers are elected, but their term of office does not begin until the first of the year.

There is an increased interest manifested in the Board each year. It has brought the subject of spraying before farmers, causing them to experiment and investigate the question, and while some have been converted, many are yet skeptical, feeling that last year's enormous

fruit crop was an evidence that spraying was not necessary to produce a crop of fruit. There is a disposition with farmers to become better informed about the value of commercial fertilizers. To that end many interesting experiments have been made by members of the Board, also some in the county under the direction of Prof. Voorhees, of New Brunswick, which have shown some remarkable results. Some of our farmers have a choice of purchasing the chemicals with a guaranteed analysis and mixing their own fertilizer, feeling sure if they put the elements in the mixture they must certainly be there, and the analysis by the State Experiment Station shows that they are there, which is more than can be said of many of the brands that are analyzed by the State. Among other committees that were appointed at the meeting in March, was one to visit the farm of Mr. John Repp & Sons, proprietors of Peach Ridge Nursery, near Glassboro, to examine their apple and pear orchards and investigate the spraying, and report the result. The report of the committee is as follows:

"That they made a thorough examination, and could not say the testimony for spraying was of a positive nature, for the reason that all the trees were treated alike. So positive is Mr. Repp that spraying is the only means of saving his fruit that he left no trees unsprayed; for this reason we could not make a comparison between treated and untreated trees under similar conditions in other respects. We have the testimony of Mr. Repp that his pear trees, when not sprayed, have been accustomed to lose their leaves early in August, while this year the foliage is so green and healthy there is every indication of its holding out until it and the fruit even of the late varieties are matured. The pear trees were sprayed with the carbonate of copper solution; this is regarded as good as the Bordeaux mixture as a fungus preventive. First application made as the blossoms were falling, and five times afterwards, the last being two weeks before the time to pick Bartletts. For insects on pears used one pound of London purple to 100 gallons of the carbonate of copper mixture. The apple trees were sprayed for insects only. For this purpose he used one pound of Paris green to 130 gallons of water, applying it four times during the season. He found one pound to 100 gallons was too strong even where lime was used with it. He thinks one pound to 130 gallons plenty strong enough.

"In regard to the fruit, it was fair and large. The pears were remarkably so. The proportion of wormy fruit on the apple trees was very small, and but little fruit has fallen in consequence. The foliage of the pears was very healthy in appearance and free from the leaf blight. The foliage of the apples was good, but not so healthy as that of the pears. It would be interesting to see the result of

carbonate of copper upon the apple foliage as well as upon the pear foliage. How much of the excellent exhibit witnessed by the committee was due to spraying, and how much to the superior methods of culture followed by Mr. Repp, is an open question, but the majority of the committee thinks that it is certainly worth all it costs to spray."

The following interesting experiment was supervised by Professor Voorhees, of the Experiment Station at New Brunswick. The same experiment was conducted on two farms of different soils and located about six miles apart, in this county.

EXPERIMENT WITH FERTILIZERS ON WHITE POTATOES.

Object to test, first, the effect of nitrate of soda and dried blood, when used in the presence of an excess of the mineral elements, phosphoric acid and potash ; second, the different effects of potash salts upon the quality and yield when used in connection with nitrogen and phosphoric acid.

Plan of Experiment.—Fourteen plots each containing one-fifth of an acre in area, treated as follows on the farm of Amos Gardiner, about $2\frac{1}{2}$ miles south of Mullica Hill, and farm of David S. Brown, about 4 miles northwest of Mullica Hill. The result shows that the Gardiner farm has not a sufficient amount of nitrogen to raise a crop of potatoes.

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Plot.		Pounds.	NUMBER OF BUSHELS.	
			Gardiner Farm.	Brown Farm.
1	Unfertilized	47.6	45
2	{ Bone black.....	16	} 107	127.6
	{ Muriate potash.....	8		
3	{ Nitrate of soda.....	10	} 187	125.5
	{ Bone black.....	16		
	{ Muriate potash.....	8		
4	{ Nitrate of soda.....	10	} 159.5	140.7
	{ Bone black.....	16		
	{ Sulphate potash.....	8		
5	{ Nitrate of soda.....	10	} 144.3	122.7
	{ Bone black.....	16		
	{ Kainit.....	32		
6	{ Bone black.....	16	} 102	138.2
	{ Sulphate potash.....	8		
7	Unfertilized	24	64
8	{ Dried blood.....	14	} 169	173
	{ Bone black.....	16		
	{ Muriate potash.....	8		
9	{ Dried blood.....	14	} 155.6	181
	{ Bone black.....	16		
	{ Sulphate potash.....	8		
10	{ Dried blood.....	14	} 102	121.3
	{ Bone black.....	16		
	{ Kainit.....	32		
11	{ Bone black.....	16	} 77.3	115
	{ Kainit.....	32		
12	Barn-yard manure.....	2,000	144	162.3
13	{ Barn-yard manure.....	1,000	} 160	164.1
	{ Nitrate of soda.....	5		
	{ Bone black.....	8		
	{ Sulphate potash.....	4		
14	Unfertilized.....	47	41.5

The result shows that it is better for every farmer to do his own experimenting to ascertain what chemicals his soil requires in making his fertilizer, as previous treatment has much to do with the requirements of the soil in plant-food, to produce a crop. As is shown in the experiment, Mr. Brown's farm is a sandy loam, having been used for a number of years in growing truck, sweet potatoes, principally, and treated heavily with Philadelphia manure; showed by the experiment that his soil did not require so much nitrogen from nitrate of soda to grow a crop of potatoes as did Mr. Gardiner's, while the nitrogen from dried blood seemed to supply a deficiency in his soil, and the sulphate of potash gave better results than the muriate. Mr. Gardiner's farm, a gravel and clay loam, has in the past been treated with manure made on the farm, made by fattening steers, and in years past treated with greensand marl. The experiment shows that it required more nitrogen than it did of the mineral elements, potash and phosphoric acid; and the nitrogen from nitrate of soda gave him better results than the nitrogen from dried blood, and while the sulphate of potash gave Mr. Brown the best results, the muriate of potash did better for Mr. Gardiner.

At the meeting held in September, the Board appointed a committee to make arrangements for a Farmers' Institute to be held in the near future. The committee responded to the appointment, and made the necessary arrangements for an Institute in Mullica Hill on November 11th and 12th, under the auspices of our County Board, and to be conducted by Franklin Dye, Secretary of the State Board.

The following programme was prepared for the occasion :

Growing and marketing pears. John Repp, Glassboro.

Disease germs affecting domestic animals. Peter Peters, V. S., Mullica Hill.

Taxation. Jesse Brown, Swedesboro.

Experience with ensilage. Elwood Evans, Haddonfield.

How to secure a good crop of grass. Adam Graff, Elmer.

The culture of corn. Albert Heritage, Swedesboro.

How shall we educate our children to make them successful farmers? Mary R. Brown, Swedesboro.

Random thoughts on current events. Secretary Dye, Trenton.

The rights of farmers' wives and daughters. Martha Pancoast, Swedesboro.

Raising sweet potatoes with chemical manure. Jonathan Wilde, Vineland.

The Quinby farms market (an experiment in selling farm produce). Wilmer Atkinson, editor "Farm Journal."

The improvement of roads. Clayton Conrow, Cinnaminson.

The use of manure—some recent experiments. Professor E. B. Voorhees, New Brunswick.

The programme was successfully carried out, with a large attendance of farmers, their wives and daughters. The subjects were ably treated by the persons appointed, and the audience gave their undivided attention, showing that they were interested and instructed by the occasion.

The question as to the best method of taxing is seriously claiming the attention of our farmers. The present Tax law is inoperative in this county as well as Camden, from the fact that these two counties by a special act some years ago, assess and collect the taxes two months sooner than the other counties of the State. The last act, page 386, Laws of 1888, which is a supplement to act approved April 14th, 1846. The supplement requires the township committee to meet the first Monday in September to ascertain what amount of damage has been done to sheep, &c., during the past year, and after ascertaining the amount, the Assessor is directed to assess, and the Collector to collect the amount necessary to pay the damage previous to the first Monday in September. The Assessors in Gloucester and Camden counties have turned their duplicates over to the Collectors and they have issued their tax notices, hence it is inoperative in the two counties named.

The farmers, generally, feel in this county that a fixed annual tax on dogs, with a provision for the surplus, after damages are paid, would be better than simply to assess a sufficient sum to pay damages. In some parts of the State the protection given to dogs instead of sheep has caused the abandonment of keeping sheep. The result is no damage to sheep, hence no tax for the dogs, and they are on the increase. Tax the dogs severely and we will get rid of the worthless curs and open the way for farmers to resume the keeping of sheep, which is a paying industry when properly conducted. Tax the dogs severely and use the surplus to educate our children.

HUNTERDON COUNTY.

HUNTERDON COUNTY BOARD OF AGRICULTURE.

OFFICERS FOR 1892.

<i>President</i>	V. R. MATHEWS.....	Ringoes.
<i>Vice President</i>	JOHN B. FISHER	Sergeantsville.
<i>Secretary</i>	H. F. BODINE.....	Locktown.
<i>Treasurer</i>	I. H. HOFFMAN.....	Baptistown.

BOARD OF DIRECTORS.

F. S. HOLCOMBE, Ringoes Grange, Ringoes.
CYRUS RISLER, Locktown Grange, Locktown.
N. B. RITTENHOUSE, Sergeantsville Grange, Sergeantsville.
J. S. REEVE, Kingwood Grange, Kingwood.
W. H. OPIE, Readington Grange, Readington.

DELEGATES TO STATE BOARD.

HON. B. E. TINE (two years).
JOHN B. FISHER (one year).

ORGANIZATIONS REPRESENTED IN THE BOARD.

Hunterdon County Pomona Grange, David Bodine, Locktown.
Hunterdon County Fruit Exchange, John T. Cox, Readington.
Hunterdon County Agricultural Society, Hon. B. E. Tine, Stanton.

ALLIANCES.

Hunterdon County Alliance, H. B. Opdyke, Secretary, Stanton.
Mt. Pleasant Alliance, J. B. Eckel, Secretary, Mt. Pleasant.
Pattensburg Alliance, W. S. McRea, Secretary, Pattensburg.
Bunker Hill Alliance, Joe P. Stout, Secretary, Everittstown.
Milford Alliance, E. D. Scarborough, Secretary, Milford.
Jutland Alliance, Samuel H. Boss, Secretary, Jutland.
Clinton Alliance, J. H. Exton, Secretary, High Bridge.
Baptistown Alliance, W. W. Case, Secretary, Baptistown.
Bethlehem Alliance, A. L. Shrope, Secretary, Junction.

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Bumbale Alliance, Lawrence Anderson, Secretary, High Bridge.
Sunny Side Alliance, Chas. Hummer, Secretary, Sunny Side.
Amwell Alliance, Robert H. Fisher, Secretary, Lambertville.
Pleasant Run Alliance, Morris Cole, Secretary, Pleasant Run.
Califon Alliance, J. S. Linderburg, Secretary, Califon.

ANNUAL REPORT.

BY V. R. MATHEWS.

The past year has been a prosperous one for the farmers of Hunterdon county. The wheat crop was one of the largest ever grown in the county, and quality of the best, and last year's prices are fully maintained.

Rye, a good crop (acreage small). Prices were greatly advanced on account of foreign demand, and the acreage sown this year is somewhat greater than for several years past.

Oats, about an average crop with former years; gathered in good condition.

Corn, a good crop in some sections, in others not so good, making an average yield as compared with former years.

Hay was a short crop as compared with the last two years, but the quality was much better; gathered in good condition.

Buckwheat was not a full crop on account of hot and dry weather when out in bloom. Price better than last year.

The potato crop was not an average, but the quality is good; no rot reported. Other vegetables grown sufficient for home use only, except tomatoes near canneries. Fruit was in abundance.

Apples, the largest crop in ten years; quality very good; prices low; a great many bushels were left to rot on the ground for want of a market.

Peaches, the largest crop ever raised in the county; quality below the average. In the beginning of the season prices ruled low, barely paid for picking. As the season advanced the fruit became better, and prices advanced accordingly.

Cherries, a large crop; bushels were not gathered; supply greater than the demand.

Other small fruit and berries were in abundance; quality good, but prices low.

Our dairy interest in the county is on the increase. Reports show more care taken in selecting breeds of cattle and how to feed them. The creameries of the county have been running the season with a good supply of milk and fair prices were obtained.

Pork-raising has been more encouraging this year than last, with better prices.

Sheep. The raising of sheep is on the increase, but not what it would be if worthless dogs were prohibited from running at large as they do.

Poultry-raising is becoming more extensive every year. Greater care is being taken in selecting breeds for egg production as well as raising chickens.

Owing to the high prices paid for turkeys, ducks and geese they are more extensively raised.

The raising of horses is on the increase. Farmers are beginning to realize the fact that they are paying out too much money for Western horses. The same may be said of young cattle for dairy purposes. Too many scrub calves have crept into farmers' barn-yards.

In the lower part of the county the raising of tomatoes for the purpose of supplying the canneries at Lambertville and Stockton is quite extensive. There were put up in the establishment at Lambertville, N. J., 540,000 cans of tomatoes and 1,000 barrels of catsup. The manufactory at Stockton makes catsup only. The output this season was 1,200 barrels and 11,000 cases.

The raising of peaches in the upper part of the county is extensively carried on. The New Jersey Fruit Exchange, located at Flemington, established branch exchanges on the line of the Lehigh Valley railroad, which did a flourishing business, and reports from shipping points in the county show there were about 1,200,000 baskets shipped this season.

Farms have been slow of sale. A number have been offered but few sold; prices low. The reporter, a year ago, predicted a boom in real estate in the near future, but his predictions have not as yet been verified.

The law passed by the Legislature last winter concerning taxes was not strictly followed by the Assessors throughout the county. As far as known only two townships or taxing districts were assessed as the law contemplated. The township of East Amwell was assessed as the law requires; the results of that assessment, as appears on the duplicates of 1890 and 1891, are as follows:

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Old law assessment, 1890—	
Value of real estate	\$784,625 00
New law assessment, 1891—	
Value of real estate.....	558,581 00
Loss.....	<u>\$126,044 00</u>
Old law assessment, 1890—	
Personal property.....	\$590,311 00
New law assessment, 1891—	
Personal property.....	818,168 00
Gain.....	<u>\$227,857 00</u>
Old law assessment, 1890—	
Total debt.....	\$389,547 00
New law assessment, 1891—	
Total debt.....	361,689 00
Loss	<u>\$27,858 00</u>
Old law assessment, 1890—	
Amount taxable.....	\$985,389 00
New law assessment, 1891—	
Amount taxable.....	1,015,060 00
Gain.....	<u>\$29,671 00</u>

It will be seen that a deduction was made in real estate values, while personal property was greatly increased. The total debt was considerably less, yet the amount taxable made a large gain. Both years' assessments were made by Levi Holcombe, Esq., Assessor of East Amwell township.

ASSESSOR'S REPORT OF NUMBER OF HEAD OF STOCK IN
EAST AMWELL TOWNSHIP.

Number horses.....	555	Number steers.....	178
Number colts.....	49	Number bulls.....	47
Number mules.....	46	Number sheep.....	950
Number cows.....	933	Number lambs.....	306
Number heifers.....	146	Number stallions.....	2

The supplement to the Road law passed last winter by the Legislature has caused considerable dissatisfaction in some localities. When the law is better understood and carried out by the Township Committees, as required, and such changes and alterations in districts as may be necessary, and more practical persons be chosen for Overseers, better roads will be made without any greater expense.

Much of the present bad condition of our public roads is due to incompetent Overseers.

The New Jersey Experiment Station and Weather Service Bulletins are largely circulated among our farmers, who seem to appreciate them very much.

Our County Board has held three meetings during the past year. The first one was held the latter part of February, 1891, at Mount Pleasant. The day was very stormy, which kept many away, but a considerable interest was manifested in the discussions. The second meeting was held at Sergeantsville, August 15th. This meeting was well attended.

The regular order of business was called and a Crop Reporter was elected for the ensuing year.

It was agreed to hold a Farmers' Institute in November at Flemington, and a special committee of three was appointed to make the necessary arrangements. In the afternoon Hon. Edward Burrough and Secretary Franklin Dye, of the State Board of Agriculture, addressed the meeting. Hon. R. S. Kuhl, of Flemington, also gave an interesting address, and after remarks from others the meeting adjourned.

Soon after this meeting arrangements were made for holding the Institute in the Court House at Flemington on the 17th and 18th of November. The following programme contains a list of speakers and topics discussed :

MORNING SESSION.

Opening address by the President. Calling roll of delegates.

Possibilities of the future fruit industry of Hunterdon county. Wm. W. Case, Baptistown.

AFTERNOON SESSION.

Enemies to fruit and vegetables grown. How to overcome them. Prof. Byron D. Halsted, New Brunswick.

Past, present and future of New Jersey agriculture. Hon. Edward Burrough, President of the State Board of Agriculture.

Diversified farming ; its advantages. Robert K. Tomlinson, Solebury Farmers' Club, Bucks county, Pa.

Points essential to success in farming. S. B. Ketcham, President of the Mercer County Board of Agriculture.

EVENING SESSION.

Horticulture and floriculture. Wm. Lyman, Lambertville.

MORNING SESSION.

How to make poultry profitable. John E. Barber.

Additions to general farming, such as small fruit and vegetables. Can it be done with profit? J. B. Sherman, Stockton.

Criticisms of our dairy, husbandry, cattle—feeding them and handling their products. Hon. Isaac W. Nicholson, Camden.

Our neglected sheep industry. How to revive and management required. Hon. Wm. Fritts, President of the Warren County Board of Agriculture.

Suggestions as to improvements in the method of marketing farm crops. D. D. Denise, Freehold.

Just enough. Franklin Dye, Secretary of the State Board of Agriculture.

The first day of the Institute meeting was very stormy and the attendance was small, the storm no doubt prevented, but Wednesday was fair and there was a good attendance. The committee felt that their effort in getting up the meeting was not in vain.

The third meeting of the County Board was held on Saturday, December 19th, 1891, in the Court House at Flemington. This being the annual meeting, an election of officers for the ensuing year took place; after which resolutions were offered and adopted, which brought out considerable discussion.

There are five Granges in the county, and they report increased membership.

Pomona Grange held its quarterly meeting at Locktown, on the second Friday in October, and in connection with the Grange meeting, a grain, fruit and vegetable exhibition was held; the different sub-Granges all contributing, made a very creditable display.

The Farmers' Alliance in the county the past year has greatly increased, both in organizations and membership, which looks as though farmers thought organization is necessary.

The following organizations are reported in good condition to our County Board :

STATE BOARD OF AGRICULTURE.

RINGOES GRANGE.

Master.....WM. H. MANNERS.....Wertsville.
Secretary.....JACOB DILTS, JR.....Ringoes.

SERGEANTSVILLE GRANGE.

Master.....N. B. RITTENHOUSE.....Sergeantsville..
Secretary.....JOHN B. FISHER.....Sergeantsville..

LOCKTOWN GRANGE.

Master.....CHARLES HARDEN.....Locktown.
Secretary.....V. C. BODINE.....Locktown.

KINGWOOD GRANGE.

Master.....A. G. HAWK.....Baptistown.
Secretary.....ANDERSON KLINE.....Barbertown..

MERCER COUNTY.

MERCER COUNTY BOARD OF AGRICULTURE.

OFFICERS OF THE BOARD.

<i>President</i>	S. B. KETCHAM.
<i>Vice President</i>	WALLACE LANNING.
<i>Treasurer</i>	H. R. WITHINGTON.
<i>Secretary</i>	FRANKLIN DYE.

DIRECTORS.—J. V. Green, J. B. Horn, A. L. Holcombe, Edw. Howe, David Lee, D. C. McGalliard, J. F. Phillips, T. B. De Cou, Wm. S. Riggs, Gilbert D. Rue.

LEGISLATIVE COMMITTEE.—S. B. Ketcham, J. V. Green, A. D. Anderson.

DELEGATES TO STATE BOARD.—S. B. Ketcham, one year; Ralph Ege, two years.

SOCIETIES REPRESENTED.

Hopewell Farmers' Club, organized 1868.
Mercer Grange, No. 77.
Pennington Grange, No. 64.
Hamilton Township Agricultural Association.
Princeton Agricultural Association.
Hamilton Grange, No. 79.
Ewing Grange, No. 73.

ANNUAL REPORT.

In estimating the condition of the farmers of a State or county, it is necessary to consider the decreased value of farms now from the prices paid for them near or during the decade of 1870 to 1880 by persons who still hold them. Mortgaged at six per cent. as the

most of our farms were at that time for from one-third to one-half their then value, the depreciation in farm values has left very many farmers, though still holding their farms, in possession of a property worth but little if any more than the mortgage placed on it years ago, what they paid on it having vanished away by the downward tendency indicated. And the exceptions will be very few where purchasers during the period named will be able to sell for as much as they paid. Although it is not pleasant to do so, it seems every way better to make our calculations of earnings on the basis of the present value of our plant. What is lost in shrinkage of values is irretrievably gone to present owners, in all probability, and it will afford greater peace of mind to so consider it.

Going forward on the basis of present values, and making all calculations of expense or profit from that standpoint, it will be found that most of our enterprising, intelligent farmers are making farming pay—pay not large returns, indeed, but a living over the annual interest, expenses of improvements and repairs, and in some cases, at least, a small surplus over all the above. People lose in all lines of business, but is it business-like to add irretrievable losses to the cost of our plant and continue to calculate our returns from such a basis? That man is poorest who feels himself poor, and wealth includes more than money. If we include in our estimate many advantages possessed by farmers over the masses engaged in other callings, or over the limited number whose annual money income is larger, the difference in the essential prosperity of the two classes will not be against the tillers of the soil. What are the obstacles in the way of a greater degree of prosperity in agriculture? Debt, too high a rate of interest, constantly-increasing taxation, scarcity of efficient farm help, available help too costly for its ability to do farm work, neglect of home resources, inattention to crop diversification and disregard of organization and co-operation. Debt must be removed by faithful, economical farm management; the rate of interest can be reduced only when farmers generally unite in demanding it, and the same is true of taxation. Help will return to our farms when farmers are able to pay wages equal to the wages paid by other employers.

The failure to utilize home resources, of wasting manure, of undrained land, of cultivating a too large acreage of half-fed crops, of keeping and feeding unprofitable stock, of harvesting crops unseasonably and storing the same so as to destroy their feeding value, of inju-

ditions, uneconomical feeding, &c., &c., can only be overcome when farmers who are in the habit of such practices learn to farm more intelligently. By a close attention to market demands and the cost of production of the several crops, compared with their market value, it sometimes becomes possible, by the changing from one crop to another, or by the addition of a crop, to keep the balance in our favor. But to bring those who are willfully oblivious to the advantages of working together into a line of united action will be in the future as it has been in the past, the work of those who have been instrumental in securing to farmers as a class, benefits which they never would have received but for the pioneer corps of organization. That business which is capable of no further improvement may be said to have reached the acme of perfection. This is not true of farming. Here the fields are broad and they continually invite the enterprising owner to attempt greater things with each new year. That man who has acquired so much knowledge and has become so intelligent as to be incapable of further development is not fit for a farmer; for this is a business that requires a daily intelligent use of brain power, a thoughtful investigation of every branch of this varied industry in detail, a close observance of cause and effect. In no other business is the resultant product so likely to be in the exact ratio to the cause or causes expended to produce it. Here, he that sows sparingly shall also reap sparingly, and here, too, the liberal shall be made fat. Nature is a generous partner, but she will not do her part, much less yours, too, if you cheat her. Suitable and abundant manuring and timely and thorough cultivation are essential means to a profitable end. The farmers of Mercer county are well located and compare favorably with the advanced farmers in other counties of the State. We have some slow farmers, but we have also some of the best in the State, and the large majority belong to the progressive class as agriculturists. In the matter of organization, it is to be regretted that so many of our leading farmers, comprising in some cases whole townships, take no interest in any farmers' organization; and yet they all belong to one or the other of our political parties. Why not, then, belong to an organization of their own class which seeks only to advance the farmer's interests? The agriculture, horticulture and stock interests of any county can be greatly advanced by organization. The facts as they exist prove the statement. I invite the farmers of Mercer county to take part in the County Board of

Agriculture with those who now constitute its membership, and would ask our members to do all in their power the coming year to increase the membership and efficiency of the Board as a practical farmer's organization.

A marked falling off is noticed in the old-time area of buckwheat, oats, and lately, to some extent, wheat, while potatoes and rye are steadily increasing. More attention is also being given to the production of milk for home demands and for the Philadelphia market. Successful competition in this business involves careful selection and propagation of stock, judicious feeding, most approved stabling and handling and general good management. A man who does not give attention to details, or who is slovenly and careless in his management, or who expects to succeed with inferior stock, poorly fed, will be disappointed. This is becoming more and more the case also in general farming; competition is so close that the best methods, under the most intelligent direction, are absolutely necessary to insure success. Slovenly, superficial work and incompetent management too often prevail in general farming. Why should not our farms be run with as much care and under the same pressure for profitable returns that market-gardeners exert to bring their acres into profit? Most crops were large and prices correspondingly low, although grain is commanding paying prices, and hay, owing to a short crop, is in good demand.

The milk product of the county is very large and annually increasing. The large city of Trenton, with other growing towns throughout the county, take most of this product. But on the line of the Reading railroad, in the northwestern part of the county, heavy shipments are made to Philadelphia. There is but one creamery in the county.

Canning is on the increase. Besides the factory started last year at Titusville, which is doing a thriving business, another was started on a stock basis at Hightstown last spring. The stock is owned by farmers, and contracts for fruit are made with stockholders exclusively. They report having put up 250,000 cans alone, besides squash, being a product of 100 acres. The results of the year's work have been satisfactory.

As the demand for such products is growing the year round, it is possible that other neighborhoods might embark in similar enterprises with profit. A *good* article of canned goods, of whatever kind, is an important point with buyers who are *consumers*.

MERCER COUNTY.

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For crop yields for the county, see table, page 42.

The value of farm lands for the county may be stated at about the same as three years ago, with a slight advance near our cities. All reports agree that farm laborers are decreasing, and the cause is attributed to the tendency to seek employment in factories. Reports are also unanimous that wages are advancing; \$15 per month with board and \$25 without, being about the average for the two classes. Reasons for the abandonment of some crops are diminished productiveness and low price. In some localities spraying for the preservation of fruit is increasing, while in others no attention is given to it. Hopewell and Princeton townships report more interest being taken in road improvement. The former township says the present Road law is giving good satisfaction, and Lawrence is well pleased with it also; other sections remain indifferent to the whole subject. To improve their condition as a class, it is suggested by some that farmers organize; by others, stop legislation for one class at the expense of other classes; and still another says, attend to their own business. The latter answer will include all the others and much more, if carried out thoroughly. Princeton only reports a greater interest manifested in farmers' organizations. It is too true that farmers in general throughout a large part of the county are totally indifferent to this important means of improvement. It will require another turn of the screw of depression, another increase of taxation, before many farmers will avail themselves of possible means for improvement and relief. Mercer county has a naturally-productive soil, is capable of a high state of cultivation, has excellent market and transportation facilities, educational advantages that are unsurpassed, and a road system capable of further development. We believe improvement will come for the latter much faster in the near future than has been accomplished in the past. With good roads all the year our county would be unexcelled, both as a place of residence and for farming purposes. The County Board of Agriculture does well to consider this question. There are no abandoned farms in the county, which shows that they are too valuable to lie idle. Farm stock of all kinds seems to be in a healthy condition. To the question, "What is the greatest need of agriculture to-day?" the following replies are given:

To purchase on same basis we sell by; larger markets; lower taxes; lower rate of interest and lower freight rates; *knowledge and application*. These answers are very comprehensive. The last one covers

all the rest, and it, if realized, will resolve all difficulties and remove most of the obstacles to success in agriculture. County Board meetings have been maintained with a good degree of interest, but the loss by death of some of our best members has been felt in our meetings.

A short summary of proceedings is given. During the year past, the following subjects have been brought to the attention of the farmers of the county who desired to hear and take part in discussing them.

At the annual meeting, March 17th, in his annual address, President Ketcham stated that there never has been a time that demands greater scientific knowledge on the part of agriculturist and horticulturist than the present time.

A farmer now, in addition to being a practical workman, requires some knowledge of plant life, chemistry and entomology. These subjects a few years since were unheard of in a farming community, but organizations of this nature, aided by well-conducted experiment stations, are educational channels leading to thought and study.

The crops in this section for the past year, save in the portion visited by the hailstorm, were more encouraging than of the previous year.

The agricultural depression has been felt and the farmers' cry has been heard throughout the land. Their power is being felt, and both State and National authorities have inclined their ears. The State Executive, with the Commission from the Legislature and State Board, last year arrived at the conclusion that but little could be done by this or any single State to better this condition. The relief must come through favorable action by the National Government. All admit that the solid basis of prosperity is an equalization of production and consumption, whether it be agricultural, mechanical or commercial pursuits, and any national enactment that would aid to establish such a basis would certainly be attended with good results. For this purpose our representative farmers have come to the front, and never before have the yeomanry of the country received the same attention and been accorded the respect as was shown them by the Congressional Committee a year ago. At their request the recent revision of the tariff contains a greater advance in the line of agricultural products than any other class, and articles that previously were brought to our markets in large quantities from other countries, as potatoes, barley, oats, onions and eggs, with numerous others, have

been advanced from fifty per cent. to three hundred per cent. ; and while a few articles the farmers may need have been increased, others have been reduced greatly in their favor. It certainly is of no benefit on those articles for which a foreign market is our outlet, but when we consume at home all that is produced, it will aid in preventing competition with the cheap productions of other nations.

Another question of a serious nature presents itself on the subject of import duties. If our tariff laws are prohibitory against other nations, they will retaliate, and in the same manner legislate against our surplus, and hence the only solution is to establish such commercial relations with other countries as will give us favorable opportunities for exportation.

The recent act of Congress in admitting sugar from Cuba free of duty, while the Spanish Government demands \$5 tax on each barrel of flour imported from the United States, both being products of the soil, is a trade no country school boy would consider profitable.

Through reciprocity different countries may be greatly benefited. That such arrangements can be made is shown by the recent treaty with Brazil, whereby their ports are open to receive our agricultural products free of duty, and we, in return, receive staple articles consumed in every family on the same terms. Whatever will secure to us markets for our surplus on a paying basis, let us encourage with hopeful expectation, trusting that other countries will meet us on friendly terms and a brighter day may dawn upon us. While the farmers have thus been recognized by our lawmakers, new organizations, with new schemes, are being pushed to the front, which, if persisted in, may weaken our influence. The Farmers' Alliance and Industrial Union have come into existence almost spontaneously, and are a power in some of the Southern and Western States, even making inroads in the national council. This, if pursued with proper zeal, is commendable.

But that which aims to divert the national treasure from its regular channels, as the sub-treasury scheme, is something that needs careful and judicious manipulation. Any governmental act that unsettles the finances of the country is sure to be felt by the agriculturists. Currency that is not at par with the recognized standard of other countries may, for a time, force a boom in prices, but the reaction that would follow affects our industry and we are the last to recover.

The farmers have been emphatic in denouncing class legislation,

and to ask and even demand the United States Government to loan money on farm lands and products at two per cent. would be contrary to all former utterances and principles.

Burdensome taxation has been the complaint for years, and while the executive and legislative powers have taken some interest in the agricultural depression, how much has been done to lighten the heavy load? What is not being done to increase the burden?

The establishment of a Bureau of Agriculture. What is its object? By whom is it demanded? In a recent examination of the reports of the County Boards and the various resolutions presented at the recent meeting of the State Board of Agriculture, not one asked for, or even suggested, the needs of such an office.

A glance at the past, a moment's thought on the present, show us the importance of having careful and prudent men in all positions of public trust. While we may not agree with the farmers of the West, in some extreme measures, the time may demand that for our own protection we lay aside present party alliances and choose men who shall rule righteously and well. The enactment of a new tax law, as reported by the commission, instead of decreasing the taxes on farm property, would in many cases tend to an increase. The proposition to value land and the buildings thereon separately would be not only unreasonable but unfair. The correct value, established the world over, is the market price, and the value of a farm is determined as a whole and not in parts.

The reckless extravagance in county affairs has frequently been alluded to in the discussions of the Board. How to provide a remedy is a question that might puzzle our dignified Tax Commission.

A glance at the tax rate for county expenses shows the rate in 1881 twenty-four cents per \$100, with a gradual increase, until last year it reached forty cents per \$100, and if to this had been added the amount borrowed, for which the county is bonded, the rate would have been double in less than ten years.

With an economical administration of public affairs and a method to secure the just taxes on all property, the building of less costly bridges, the needed improvements in our public roads could be made, benefiting a much greater number and no one burdened.

At the same meeting an address was given by Theo. F. D. Baker on "Market-Gardening for Profit," and Prof. Byron D. Halsted spoke on "Seeds and Their Relations to the Harvest."

At subsequent meetings through the year "Losses and Gains on the Farm; Showing Where the Former Lie, of What Character and How to Obviate Them or Turn Them Into Gain;" "The Farmer in Politics: or, What Can the New Jersey Farmer and Agriculture Gain by Political Action? How Can He Best Secure the Supposed Advantages?" "Fertilizers and Fertilizing Ingredients, in Connection With Their Application to Crops and the Misunderstood Results Which Sometimes Follow Their Use," Dr. E. B. Voorhees; "The Condition and Prospects of Farming and of Agriculture in New Jersey in 1891 Compared With 1890, Comparative Cost of Production and the Value of the Several Farm Crops."

Other questions appropriate to the time of the year and the needs of agriculture were presented and discussed at the various meetings.

Our custom is, whether a visitor or member opens a subject, for all present to take part in questions and answers. This course gives each meeting something of the institute character and adds to their interest and value.

INTER-STATE FAIR ASSOCIATION, TRENTON, N. J.

Report of the Board of Directors.

TRENTON, N. J., February 27th, 1892.

To the Stockholders of the Inter-State Fair Association:

The broad policy which had achieved the success of the past was adopted by your Board of Directors at the outset of the year, and under its influence the Fair of 1891 was, like all its predecessors, marked by an upward lift and a forward movement.

Achieved success helps the future by inspiration, and our progress has been more marked than in any previous period. We have led in every sense; to do less than this would be to reverse our methods—methods which have found their strongest indorsement and broadest application in the results of the fiscal year just closed.

The attendance of the Fair of 1891, as registered by the turn-stiles, was 93,100, being an increase of 15,195 over that of 1890. This increase was largely made up of a patronage from points at a considerable distance, and brought to us many of the best people of Philadelphia and towns in the southern part of the State, as well as many from points east of Trenton, on the New York division, and from

Monmouth county. The attendance from the Belvidere division was also largely increased, as was that from points in Bucks county ; considered as a whole, our patronage was certainly a very glowing compliment to the attractive qualities of our exhibition.

The permanent improvements to our plant, made since the last annual report, consist of two new barns for the Show Horse Department, covering fifty (50) stalls 10 x 15, and sixty (60) stalls 10 x 12, with necessary grading and digging of wells to supply water for the same ; a new enclosed cattle stable for the accommodation of the milk breeds, containing sixty-four (64) stalls 7 x 10 ; fencing the additional area to accommodate these buildings ; moving the large sign, ticket offices, &c. ; placing additional fixtures in Poultry Building and in Exhibition Buildings No. 1 and No. 3, for the accommodation of the exhibits therein ; the purchase of a large tent 50 x 125 for shelter and the erection of lunch tables, &c., in the grove.

We have also constructed accommodations at the south end of the Grand Stand, relieving, to some extent, the crowded condition of that structure.

In addition to these permanent improvements, careful attention has been given to the maintenance of the plant.

The Farm House, Exhibition Buildings Nos. 1 and 2, the Poultry Building, Judges' Stand, Secretary's office and ticket offices have been repainted, and all the buildings thoroughly repaired where needed.

The total cost of permanent improvements and betterments for the year was \$15,552.44 ; of this amount there is still due \$2,500, which is represented by a note of the Association outstanding for that amount.

The gross receipts of the Fair were.....	\$63,994 92
Expenses.....	47,247 38
Leaving a net profit of.....	<u>\$16,747 54</u>

It was deemed wise by your Board of Directors to declare from these earnings a dividend of six per cent., thus raising the income of the stock to the holders thereof to a level with the best class of securities, and leaving a balance of \$9,847.54 to be carried to the general account.

We congratulate you upon the continued prosperity of the Association, and present you with the following schedule of assets and liabilities :

MERCER COUNTY.

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ASSETS.

Real estate.....	\$19,771 61
Buildings and improvements..	120,359 84
Furniture and fixtures.....	4,905 87
Cash on hand.....	34 02
	<hr/>
	\$145,071 34

LIABILITIES.

Capital stock.....	\$115,000 00
Notes outstanding.....	2,500 00
Undivided profits, 1888.....	2,737 07
" " 1889.....	5,034 13
" " 1890.....	9,952 60
" " 1891.....	9,847 54
	<hr/>
	\$145,071 34

By order of the Board,

JOHN GUILD MUIRHEID,
Secretary.

MIDDLESEX COUNTY.

MIDDLESEX COUNTY BOARD OF AGRICULTURE.

OFFICERS FOR 1892.

PresidentZENAS HENDERSON.....Milltown.
Vice President.....S. BLISH.....New Brunswick.
SecretaryJ. M. WHITE.....New Brunswick.
Treasurer.....C. E. D. PHELPS New Brunswick.

DIRECTORS.

JOHN B. FIELD.....Bound Brook.
D. C. LEWIS.....Cranbury.
J. G. CORTELYOU.....New Brunswick.
W. T. WORNER.....New Brunswick.
JAHU PIERSON.....Jamesburg.
GEO. W. MOUNT.....Kingston.

DELEGATES TO STATE BOARD.

J. M. WHITE (term expires January 1st, 1893).....New Brunswick.
S. BLISH (term expires January 1st, 1894).....New Brunswick.

ANNUAL REPORT.

The Board has held five meetings during the year, with a good deal of interest manifested. Three new members have been added, and the same number lost by death and removal.

On January 12th, 1891, the question of taxation was most earnestly discussed, and the general sentiment seemed to be that farmers were paying very much more than their just proportion of taxes, and that there was a necessity of new tax laws. At the same meeting Secretary Dye, of the State Board, delivered an address on "Are Farmers as a Class Doing as Well as they Might? Business Methods

Applied to Farming the Key to Success." Thanks were voted the speaker and a lively discussion of the question followed.

On February 9th, the question of holding a Farmers' Institute was discussed, and the Board voted to hold one at such time as should be decided upon by the Executive Committee of the State Board. Prof. J. B. Smith at this meeting addressed the Board on "Fertilizers and Cultivation as Insecticides." This address was highly appreciated.

D. C. Crane, of Union county, also spoke on "Better Roads for the Farmer; Do they Pay for the Increased Cost?" This was also followed by discussion.

On March 9th, "The Value of Crop Reports" was discussed, and it was concluded that these reports were of great value to farmers, and the members, generally, manifested a willingness to aid in collecting data for such reports. Prof. E. B. Voorhees at this meeting addressed the Board on "Fertility; How Shall the Farmer Convert it into Produce of the Highest Value?" This address was highly appreciated and followed by an interesting discussion.

November 9th, "Have Farmers been Benefited by the New Tax or Road Laws?" was discussed, and the unanimous sentiment was that these two laws should be repealed, and resolutions to that effect were passed.

The present year has been one of general prosperity for the farmer, and abundant crops of almost everything have been harvested. Prices for all large fruits have been low on account of the great abundance, but an excellent foreign demand is helping the price of apples. Potatoes were much injured in our county by prolonged drought in June and later by blight, but the average large crop keeps prices at forty to fifty cents per bushel. Notwithstanding drought and blight a few large crops are reported in the county. Abial Price reports 3,600 bushels sold from eleven acres, and one or two of his neighbors are not far behind him, but I have not their exact figures. D. C. Lewis reports 3,544 bushels sold from sixteen and a half acres, and that the small and rough ones would bring the entire crop to above 4,000 bushels. A portion of the field planted to Rochester Rose exceeded three hundred bushels per acre.

Hay was a half to three-fourths crop, but prices are at present \$16 for the best.

Cabbage was a full crop and prices low, \$1.50 to \$3 per hundred.

Questions of the Executive Committee are answered in part immediately below, with remarks by a correspondent added.

J. M. WHITE,
Secretary.

Spraying fruit is on the increase. More interest is taken in road improvement. Some think present Road law should be repealed. Farmers can improve their condition and advance their interests by attending closely to their farms, read daily papers, combine on road improvements and thorough organization. The greatest need of agriculture is thought to be better grade of farm laborers, cheaper fertilizers, high feeding of the soil and close attention to the farm. Study and economize.

One correspondent writes thus :

"Prices of all kinds of grain are 25 per cent. higher than last year, owing to the shortage of the same in Europe. Therefore, this fall there has been a noticeable increase of acreage sown all over the county. The potato crop was short all over this section, owing to prolonged drought in June. Prices are low, owing to the large acreage planted and better yield in other places. The greatest need of farmers, in this county especially, is *better roads*. We should take example of Union county, where they are having the main roads macadamized. Property there is bringing from one-half to one-third more to-day than two years ago. I know of one instance where a man had some building-lots for sale at \$100 per lot, but could not sell at that; now, since the roads have been macadamized, he has no trouble to get \$250. Therefore, I say, give us better roads, and our land will be worth nearly double. Another thing we farmers want is free postal delivery in the country. We are as much entitled to it as the city resident. We pay a larger proportion of tax than he does, and why should we not have the same privilege? These two things would help the agricultural interests of this or any other State more than any laws needing the attention of our Legislature. Then life in the country would be a pleasure indeed."

MONMOUTH COUNTY.

MONMOUTH COUNTY BOARD OF AGRICULTURE.

OFFICERS FOR 1892.

<i>President</i>	H. V. M. DENNIS.....	Freehold.
<i>Vice President</i>	DAVID BAIRD.....	Manalapan.
<i>Secretary</i>	D. AUGUSTUS VANDERVEER.....	Manalapan.
<i>Treasurer</i>	JOHN B. CONOVER.....	Freehold.

BOARD OF DIRECTORS.

JOHN H. DENISE.....	Freehold.
W. H. REID.....	Tennent.
JOHN L. CONOVER.....	Wickatunk.
RUSHMER MILLER.....	Farmingdale.
SAMUEL W. FOWLER.....	Allentown.

EXECUTIVE COMMITTEE.

D. D. DENISE.....	Freehold.
MICHAEL TAYLOR.....	Red Bank.
C. D. B. FORMAN.....	Freehold.

DELEGATES TO STATE BOARD.

C. D. B. FORMAN (one year).....	Freehold.
H. V. M. DENNIS (two years).....	Freehold.

COMMITTEE ON LEGISLATION.

D. D. DENISE.....	Freehold.
Dr. W. S. COMBS.....	Freehold.
C. D. B. FORMAN.....	Freehold.

Organizations represented in the Board:

FRUIT-GROWERS' ASSOCIATION.

<i>President</i>	WILLIAM MORRELL.....	Hazlet.
<i>Secretary</i>	TAYLOR H. CARHART.....	Hazlet.

MONMOUTH GRANGE.

Master.....J. H. DENISE.....Freehold.
Secretary.....WM. H. DU BOIS.....Marlboro.

LIBERTY GRANGE.

Master... ..L. G. SCHANCK.....Bradevelt.
Secretary.....B. D. B. SMOCK.....Wickatunk.

ALLENTOWN GRANGE.

Master.....L. TILTON.....Allentown.
Secretary.....GEO. W. TILTON.....Ellisdale.

MEETINGS.

The regular meetings are held at Freehold in January, March, August and November.

ANNUAL REPORT.

BY D. AUGUSTUS VANDERVEER, SECRETARY.

Our membership is increasing and the value of our meetings and discussions is becoming better understood by the farmers of the county.

Four regular and one special meetings have been held during the year. Most of them were more largely attended and more interest shown than in previous years. We have been well supplied with speakers, both from other sections of our county and from our own locality. A great variety of subjects were discussed and several experiments with farm crops and fertilizers made by our members.

The general condition of the agricultural and horticultural industries throughout the county is shown by the Directors' annual report, read at the annual meeting, November 24th, by J. H. Denise.

Meetings of County Board.

The first meeting of the year was held January 24th, 1891, when the following reports of experiments made the past year were read: On "Grass," by A. S. Lambertson; on "The Spraying of Fruit Trees," by Frank Denise; on "Tomatoes," by J. H. Baird; address by Prof. E. B. Voorhees, subject, "Rational Use of Manures, Including Some Results of Experiments on Tomatoes and Potatoes;" address by W. R. Ward, Esq., subject, "Will it Pay, Judging by the Profit of the Past Ten Years, to Set Out Orchards of Apples, Pears and Peaches?" At meeting of March 14th papers were read on the following topics and discussed: "Cultivation of Potatoes," by Aaron Smock; "Profits and Wastes of the Farm," by L. G. Schanck; "What Practical Benefit Do Farmers Receive from the State Board of Agriculture?" by D. D. Denise.

Address by Hon. Mortimer Whitehead. Subject—"The Old and the New Farmer."

Special meeting, May 2d, address by Prof. John B. Smith. Topic—"Spraying Fruit Trees."

Meeting August 22d. Topics discussed by members, "The Most Profitable and Productive Varieties of Wheat; Best Method of Putting the Ground in Order and Quantity of Seed to Sow," by J. Woodward. "What is the Best Time and Method to Sow Grass Seed upon Stubble?" by J. H. Denise. "Is it Profitable to Sow Corn Ground with Rye or Clover Seed for Fertilizing?" by J. C. Van Doren.

Meeting November 24th. Address by the President, H. V. M. Dennis. Address by Mr. D. G. Fairchild, of Agricultural Department, Washington, subject—"Some Recent Results in the Treatment of Plant Diseases." "Annual Report of Directors," read by J. H. Denise. "Experience in Spraying Grapes the Past Year," by D. Aug. Vanderveer. "Spraying of Fruit Trees," by W. H. Reid. "Experimental Work with Potatoes," by Rushmer Miller.

A part of the proceedings of the several meetings is presented below.

PRESIDENT DENNIS' ADDRESS.

President H. V. M. Dennis opened his address by noticing what the Board had gleaned during the time of its existence. He then went on to say:

The season just ended has been a most remarkable one, and the soil has responded most liberally to the work of the husbandman.

Whether this is due to climatic influence, good tillage, the McKinley bill, reciprocity, what Governor Abbett has been doing for the farmers, the application of the knowledge we have gained here, or to the combination of all these forces, is an open question, which I will not presume to decide. But it is certain that from whatever cause, the farmer should be satisfied ; his reasonable expectations more than realized. During the past year the work of this Board has attracted greater attention than formerly, as shown by the largely-increased attendance at the meetings. This has been a source of encouragement to us, and we should be pardoned if we feel that our labors have, in some degree, been appreciated. This brings me to the question, What is there to do in the future?

Do not by any means give up the work of the past, for we are a long way yet from having reduced the problem of agriculture to an exact science.

It seems to me, however, that having spent so long a time in learning how to produce crops, we could now devote a portion of our time profitably in trying to find a better way to market them. The present system in vogue, of consigning our produce to be sold on commission, and piling it up on an already glutted market, is pernicious, and should be reformed. The advantages of bringing producers in closer relation, is a subject worthy of our earnest attention.

It would seem that fruit of all kinds, even in a year of unusual fullness, might be put to better use for the grower, than to merely swell the profits of transportation companies, or to feed pigs. That it might be barreled up in other than liquid form, more profitable to the producer, and more economical and better for the health and morals of the consumer. The establishment of evaporators may be worth the attention of the Board.

Freight rates are too high, and cartage charges are enormous; a united effort on our part might have some influence in equitably adjusting both.

There is general complaint of the scarcity of reliable farm laborers. We might be able to devise some plan to induce worthy citizens of this class to settle among us.

We should give more careful attention to public expenditures, for which the greater part of the taxes fall on our shoulders. And there

are many other interests in common, the adjustment of which would add materially to our welfare and prosperity.

These things will not adjust themselves, and they can be accomplished only by earnest, united, organized efforts. An organization to be effective must include all, and all must be loyal and enthusiastic.

In closing, I can but reiterate the often-repeated injunction, "organize." If we hope ever to improve our condition to any great extent we must thoroughly organize; not in antagonism with those engaged in other pursuits, not to capture political office, not to demand special privileges that we condemn other classes for obtaining, not to champion crazy schemes that would unsettle or upset well-established principles of trade or finance, but organize to do and control our own business, and to look after those affairs that affect and interest us, and through combined action, produce a power that will command respect.

All the great reforms in the history of the world have been brought about by organization, agitation and co-operation, and the same process is open to us.

DIRECTORS' REPORT.

READ BY JOHN H. DENISE.

Your Directors have sought information from all parts of the county concerning the growth, yield and results realized from its agricultural and horticultural industries. The year has been one of the most bounteous in production in the history of our county.

As we are the recipients of these blessings our gratitude and homage are due the Benefactor whose open hand hath been extended to us in the crowning of the year's labor.

Asparagus.

Coming among the first of the offerings we find this luxury, which has been both productive and profitable, gross sales ranging from \$200 to \$500 per acre. This yield requires high fertilization, to which this crop gratefully responds. This industry, yet in its infancy, is worthy your closest attention. Injured but little by the asparagus beetle. Yield 100 per cent.

Potatoes.

This favorite product takes high rank with the Monmouth farmer, bringing more money directly into the treasury than any other crop. The range of yield is wide—from 30 to 206 barrels per acre. The last figure sends its greeting from Shrewsbury township. The target is high but let us aim for it. This will require our closest study of culture and fertilization, without which this crop will not realize a profit to the grower. It costs no more to cultivate an acre that may yield 100 barrels than one of 40, hence the necessity of high manuring. The average yield is given at 150 bushels per acre. Conditions have been favorable for the growth of this crop, and very little trouble to check ravages of the potato-bug. The gross sales have varied widely from \$4, at the opening of the market season, down to the present price of \$1 per barrel. These figures demand more than a passing notice.

A comparison of prices for ten consecutive years, taking into consideration the shrinkage, assures us that the early market is the best for the Monmouth potato-growers. One hundred and ten per cent. average.

Other Vegetables.

Both garden and field-crop vegetables have yielded well their increase; our tables have been supplied and the store for stock purposes is abundant where planted. More roots for stock should be grown. The beet, highly fed, is an immense yielder, furnishing more food per given space than any other crop, and is valuable for stock during the winter months, especially for grain-fed animals. Ninety per cent.

Grain.

The corn plant making no superfluous growth during its season, matured an abundant and well-ripened crop of the finest quality; some injury from the corn bill bug to the young plants. Said bug disappeared about May 20th to 25th. Average yield about forty bushels per acre, ninety per cent. of an average crop.

The smaller grains, which do not receive much attention from the agriculturists of this county, have taken their position in the front

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rank as to yield, and are saying, Take care of the little things. Average yield: Wheat, eighteen bushels, good quality; rye, fifteen bushels, good quality; oats, thirty bushels. The rye crop takes the lead as to profit.

Fruit.

The fruit crop has simply outdone itself. The generous yield will do much to revive the fruit industry of this county, which had fallen into disfavor from two or three successive failures. Prices have been low, but aside from the small revenue, the fruit of the year has contributed largely toward our table luxuries and health-giving edibles. The strawberry gave a fair yield and paying prices. The blackberry had a very short season and only moderate prices.

The grape yielded her abundance, being but little attacked by the diseases of former years, the grower being better able to manage and ward off destructive agencies. Very little net from the sale of the fruit save among the choicest varieties. Vine has made a vigorous growth, and with attention on the part of the grower, with the present means at his disposal, he should be able in the future to save a good share of the crop. Sixty per cent. of an average.

The peach yielded an average crop and the price only medium. The tree is not in its best growing condition and needs close watching by the grower.

Pears.

Some varieties of the pear have been exceedingly productive, especially the Bartlett and Kieffer. The latter, when not thinned, gave fruit of a poor flavor and at the expense of a destroyed tree. Lesson—thin the fruit in due time. The pear has yielded in some instances from 200 to 300 barrels per acre, selling at \$1 to \$3 per barrel. Sequel—Won't it pay to raise fruit? One hundred and twenty per cent.

Tree in healthy condition, no blight of wood, some early leaf blight, but can be prevented by spraying with Bordeaux mixture.

Apples.

This, the king of all fruits, presented the grower with one of her old-time returns. Thirty per cent. of crop wasted for want of mar-

ket; grower realizing but meager returns for summer fruit and but little advance on the winter varieties. Fruit improved by spraying. Market will be well supplied through the season. The apple crop of the county has been handled on a very close margin. One hundred and twenty-five per cent. of an average.

Grass.

Pasturage has been good through the whole season. Hay crop a little below an average, but of good quality. Yield, 75 per cent. of an average crop. Young grass going into winter quarters in good condition where not pastured too close.

Stock.

No prevailing diseases among farm stock. Texas fly was troublesome among cattle, but they have overcome this loss in flesh.

Prices for the year have steadily declined on hog products and we are in the midst of a weak market. Other meats sell fairly well, poultry taking the lead.

Pork-raising is an item of much interest in the upper part of the county, some farms containing as high as 200 head, producing from 50,000 to 60,000 pounds of pork. The hog is a good rooter but the milk industry, with the Jersey farmer, is fast rooting him into the sea of oblivion. The hog has his place on the farm, but I would confine him to a very small compass.

In summing up, the outlook is something brighter than one year ago. Let us hold on to the vantage-ground, cultivating a genius for details, studying the demands of the home market, making use of our available aids, namely, the Experiment Station's work, scientific research of to-day, attend farmers' meetings and lend a helping hand not only by your presence but in giving of some of the fruits of your year's toil to your fellow co-workers of the same calling. All of which will be more profitable than standing on street corners working the pump-handle of gossip.

Directors—J. H. Denise, W. H. Reid, Rushmer Miller, A. Smock and C. W. Bruere.

WILLIAM H. REID'S EXPERIMENTS.

The line of experiments as assigned me, is the "Spraying of Fruit Trees." I have prepared a few notes from my own experience. We used in spraying, a machine manufactured by the Nixon Nozzle Co. It worked well, and we were much pleased with it. The poison used was Paris green, one pound to about 175 gallons of water.

The trees in our orchard are set in rows running north and south and east and west.

The varieties are set in rows north and south. We left one row of trees crosswise of the varieties, without spraying. By so doing, we were sure to have at least one tree of each variety not sprayed. We began Paris-greening when the apples were about the size of peas, but some of the more backward bloom was still on the trees. This was on a Thursday, when we sprayed the English Codlins, Nyack and Orange Pippins, then it came on to rain, and nothing more was done in the orchard until the following Monday, when we went over all trees that had bloomed. There was dull, cloudy weather the greater part of that week, but very little rain. The next Monday, one week later, we again sprayed all trees having fruit upon them, and this work was followed with ordinarily fair weather.

The apples at this spraying were about the size of marbles. Now for the results.

In about two or three weeks' time I noticed that the foliage on all trees that had been treated with Paris green began to turn brown, and a few days after it was half on the ground. All the inside leaves dropped, and all, or nearly all outside leaves, that is, those on the tips of the limbs, seemed to be uninjured.

I felt very anxious to know what the result of this would be, and thought that we had injured our orchard. I even told our men that I thought our labor and green were worse than thrown away, believing that the trees not sprayed would be the better. No doubt you all have noticed that when the fruit is a little larger than marbles the greater part of the apples drop, probably three-fourths of them. I watched closely, but could see no difference at this time, the sprayed and unsprayed all falling alike.

But from this time on there was a very perceptible difference with all varieties, excepting English Codlins and Peck's Pleasant.

These varieties did not seem to be much benefited by the spraying. The Orange Pippins, Nyack Pippins and Ben Davis appeared to be most benefited. From the time the fruit was the size of walnuts till it was ripe I think there were from four to six times as many apples on the ground where the trees were not sprayed as where they were. At picking-time the Orange Pippin tree that was not treated had about two-thirds as many apples remaining on it as the others had, and many of these were rough and imperfect, while the others were very fair. The same was true of all other varieties, excepting English Codlin and Peck's Pleasant, but in a less degree. The Orange Pippin tree referred to above was, at the time of spraying, one of the fullest, healthiest and most promising trees of that variety.

We have alongside of the apples a small pear orchard, mostly Keiffers, with a few Le Conte and Bartletts, but there was no bloom on the Bartletts. On the first Monday that we went over our apples we sprayed each alternate row of Keiffers and each alternate tree in the row of Le Conte. At no time while the pears were growing nor at picking-time was there any perceptible difference between the sprayed and unsprayed.

Now, the question that most naturally occurs to us is, did it pay to spray? With the pears it certainly did not.

But how about the apples? In the case of all except the two varieties before mentioned I think it paid us well. This has been an exceptional year in its abundance of fruit, and while we have seen many orchards that were never sprayed loaded with fine fruit, yet, as I said before, with most varieties of apples I believe it paid us to spray for the fairness and fine appearance of the fruit if for nothing more. The few Nyack Pippins we had, like the Orange Pippins, were very fair and sold in Boston at \$4 per barrel. The Orange sold at from \$2.75 down as low as \$1.50, but they netted us on the average about \$1.10, which is a fair price for this season. A season like the one just past, when there is an abundance of fruit, and almost every tree is loaded, we do not appear to derive as much benefit from the application of insecticides as when there is a scarcity of bloom.

Next year it will probably pay those who are fortunate enough to have apple bloom to look sharp after their spraying.

I would like to know why this season's spraying benefited Orange Pippins, Nyack Pippins, Ben Davis, &c., and had no effect on English Codlins and Peck's Pleasant.

FRANK DENISE ON THE SPRAYING OF FRUIT TREES.

What I can tell you about will be facts and not theory, and I might also add that I have not made a fair test; that is, I have not made a test where all the benefits due to insecticides were realized. You gentlemen in using insecticides on your potatoes do not leave every fifth row or any certain portion of your patch, thinking that the poison you have used will kill the enemies on the plants that haven't been treated; also you know that the beetles left on the plants untreated will in time affect the plants that have been treated, and assuming that the same principle will apply to apple trees and pear trees, it is evident that the full benefit cannot be derived unless we spray all our fruit trees, and also that our neighbor over the fence, and in the field beyond, sprays his trees too. So it is plain that to make a test at all, I had to leave some in the orchard untreated in order to note the difference, if any. I used two of the most prominent insecticides known, namely, Paris green and London purple, of the latter one pound to 250 gallons of water; and in using Paris green, one pound to 200 gallons of water, the damage to the foliage was hardly perceptible.

The varieties in our orchard run north and south, consequently I sprayed the trees east and west, to show the effect on all the varieties. The dates that I give you here may not be exactly correct, and practically they are not much of a guide for you as regards spraying next year, as all depends upon the season. I sprayed apple trees May 19th and 26th, June 3d, and one row June 9th, a part only once, another part twice, another three times, and another four times, and where I sprayed the greatest number of times I noticed the best results, especially on later varieties, such as Baldwins, Smith Cider, &c. But I think spraying twice for all general purposes is sufficient, providing the weather is good, that is, in regard to rain. And quite early in the season I remarked to several that I thought spraying trees was very nice on paper, but was only an additional expense to a practical farmer or fruit-grower, but I must say that I was very agreeably surprised. There was a large per cent. of fruit saved, and brought to maturity, which on the unsprayed trees was a total loss or was carted to the distillery, that dropped before time to pick for market. There was also a very great difference in the fruit harvested at the time of maturity, as the apples were almost entirely free from the so-

called bug. And I think also we derive as much benefit from spraying, in regard to stopping or at least lessening the havoc of the curculio as we do in destroying the codling moths. I could notice when I was packing the fruit that there was a great difference in it, and could tell almost invariably whether it came from sprayed or unsprayed trees. For example, take Bartlett pears. When we were packing them a commission man came to our place and remarked that "I could get you \$10 a barrel for the pears on this side of the heap easier than I could get \$6 for those others." "Those others" which he mentioned came from the unsprayed trees. And these same trees that bore the fruit which brought in the market \$11 per barrel, while the others brought \$8, were sprayed with London purple and hardly had a green leaf on them all summer, from the effects of the poison.

Now, as to a spraying apparatus, I did not have a very expensive machine. I think it cost about \$12, and by attaching it to a barrel holding about 45 gallons we can get along with our work very nicely and quite fast, spraying from 300 to 400 ordinary trees in a day. The expensive machines undoubtedly possess some advantages over this one, but we can do our work rapidly and thoroughly with this machine, so far as trees are concerned. If you wish to spray your potatoes, then this machine will not answer your purpose so well. I would like to add that it is a very important matter to keep the dropped fruit picked up and gathered, as the larva in the fallen fruit will mature and do its work.

GRAPE CULTURE.

BY D. AUG. VANDERVEER.

I have two grape vineyards, one of 500 vines of Niagara grapes, covering about one acre of ground. The vines are ten years old; have set very full of fruit for the past eight years, but have never matured a full crop of marketable fruit, owing to mildew, black rot and anthracnose. It has received the best of care in the way of fertilizing, clean culture, careful trimming, &c.; been sprayed with the various mixtures recommended by the department at Washington, and part of the clusters were inclosed in paper bags. The past year I decided to use only the Bordeaux mixture and paper bags. I put on 18,000 bags and began spraying April 21st, using the Galloway knapsack sprayer. Sprayed again May 7th, May 14th, June 1st

and 23d, and then, not wishing to color the fruit, I sprayed with carbonate of copper and ammonia July 10th and 28th. The black rot first appeared June 29th, about two weeks later than usual. Not much damage was done until the grapes began to ripen, when the black rot and anthracnose destroyed most of the crop that was not bagged. Part of the fruit that was bagged was saved. I think the spraying was of much benefit to the vines, as it kept the foliage bright and in good condition for the next year's crop. I shall continue spraying with the Bordeaux mixture and put bags on all my Niagaras.

My vineyard of Concord grapes, of one and one-half acres, I did not spray so carefully and used no bags. I had about half a crop. The first week in June rosebugs appeared in great numbers and would have soon destroyed the entire crop, as they first attacked the young clusters of fruit. I procured a two-horse spraying machine, and mixing one pound of pure Paris green with 150 gallons of water, I drenched the vines most thoroughly, passing on both sides of the trellis and using two No. 4 Nixon nozzles. The next day the rosebugs had completely disappeared and did not return again. I could not say whether they were killed or driven away; I did not look for the dead bugs, but was only after the live ones. (It is claimed they cannot be killed by Paris green.) A few pear trees that had been defoliated for a few years past, and not maturing their fruit on account of blight, I sprayed and saved the foliage and fruit.

REPORT OF EXPERIMENTAL WORK WITH POTATOES.

BY, RUSHMER MILLER.

Gentlemen—The experiments here described were undertaken at the request of this Board for Howell township, and were carried out on the farm of Mr. Allaire, near Farmingdale, of which I am at present superintendent.

The proposition was to ascertain as accurately as possible the relative merits resulting from the application of nitrate of soda and sulphate of potash on the growth of potatoes on various soils in different parts of the county.

The field chosen for the trial was a light sandy loam, much worked down by previous cropping. Three years previously it had grown a

crop of rye, yielding only four bushels to the acre. The following year it stood in clover of excellent growth—probably cutting about two tons to the acre—the result of a very liberal seeding. The year previous to the potato crop it was planted with corn and gave a very satisfactory result, which was possibly due to careful preparations, a liberal application to the compost in the hills and extraordinary care in cultivation. The yield was about 50 bushels of shelled corn to the acre.

The part of the field chosen for the experiment was such as to give uniform quality for all of the plots to be devoted to the trial.

Four plots were set apart, containing eight rows each, being about half an acre to each plot.

The plots were fertilized in January with stable and barn-yard manures, about ten tons to the acre; a part of this was from the New York Horse Manure Co., and part was produced on the farm. It is fair to say that the home-made article, as is usually the case, made, in the end, the best showing.

The ground was plowed on March 31st and harrowed in nice shape, but no extra pains were taken with the part of the field under experiment, either as to manuring or as to the preparation.

All the field, which consists of fourteen acres in area, was treated alike. The only difference in treatment of the crop throughout consisted in the application of extra fertilizers and the special chemicals named to the trial plots.

The four plots were planted on April 13th, using an Aspinwall planter, distributing 600 pounds of H. J. Baker's Potato Fertilizer (in rows) to the acre. The amount distributed was accurately known to be correct, based upon careful weights and measurements.

The planter was adjusted to place the seed potatoes six inches deep, but, owing to the stiffness of the ground, and the consequent settling of the wheels, they were planted considerably deeper, a condition of affairs that I learned, much to my disgust, later.

After planting the potatoes the ground was harrowed thoroughly with an Acme harrow, after the seed had sprouted, and after the potatoes came up, which they did very regularly, not being at all retarded by the late frost; the ground was cultivated once before applying the special experimental fertilizers.

Nitrate of soda was applied on Plot No. 1 on June 1st, at the rate of 400 pounds to the acre.

Plot No. 2 was treated at the same time with sulphate of potash, at the rate of 400 pounds per acre.

H. J. Baker's Potato Fertilizer was at the same time used on Plot No. 3, also at the rate of 400 pounds per acre.

Plot No. 4 was left without any additional fertilizer.

This concluded the first special fertilizing, and on the same day all the four plots were plowed with the gang plow.

No difference was observable after this treatment, in the growth or color of the vines, until after the rain which occurred on June 7th, at which time it was noticed that Plot No. 1 began to grow more rapidly than the rest.

On the twelfth of June it was very apparent that not only the vines on Plot No. 1 were growing faster, but that they were all becoming a much darker green in color.

At this date the other three plots showed no difference one from the other, either as to growth or color of vines.

The same relative difference still continued up to the eighteenth of June, except, perhaps, Plot No. 2, whereon the sulphate of potash was placed, might appear a shade lighter in color than No. 3 and No. 4.

The second and last experimental application took place June 20th, when Plots 1, 2 and 3 were again treated as before, using 400 pounds to the acre of nitrate of soda, sulphate of potash and H. J. Baker's Potato Fertilizer, Plot No. 4 being again left as planted.

Between the first and second application of special fertilizers the crop was weeded out by hand and by hoeing. At the time of the second treatment with fertilizers the potatoes were again plowed with the gang plow.

The rain which occurred on June 21st, the day after the second application, no doubt greatly facilitated the dissolution of the fertilizers, to the immediate benefit of the plants.

The growth on Plot No. 1 was thereafter so rapid and rank that on July 1st the vines had entirely covered all the space between the rows, so that scarcely any ground was visible.

Up to this time the vines on the other plots had not made sufficient growth to spread out and bend down, but remained scanty and erect.

On July 10th, the blight attacked the whole field, with the exception of Plot No. 1, which remained green and luxuriant as before, a state of things which continued until the end of the season.

The vines on Plots Nos. 2, 3 and 4 were entirely dead on July 25th, as were also the vines on all the rest of the field. At the same time the vines on Plot No. 1 remained not only green and growing, but also still contained some blossoms, which seemed to be quite remarkable.

Nevertheless, while things prospered so magnificently on Plot No. 1, and while the nitrate of soda seemed to have by far the best of the bargain, sundry examinations at the root of things indicated that Plot No. 3 had the largest-size tubers. It was at this exciting part of the game that bushels of dirt changed hands under the eyes of an anxious explorer, and the depth at which the potatoes were reached gave a foretaste of what was to come. The friends of the nitrate of soda became weak-kneed and one by one relapsed, greatly to their mortification, into a sullen and dogged silence.

The fact that still on August 10th, the vines on Plot No. 1 remained green and without blight, was not considered as making up for the deficiency in size and number of the tubers, and the prospect was disappointing.

The process of ripening on Plot No. 1 began on August 20th, but the vines did not turn spotty like the others. By August 31st they were entirely ripe, but were not dug until nearly a month later.

The crops on the experimental plots, which were dug and kept separately, were as follows:

On Plot No. 1.—Nitrate of soda. Thirty barrels of first size and very nice potatoes, five barrels of seconds and five of thirds; making a total of forty barrels on half an acre; at the rate of eighty barrels per acre.

On Plot No. 2.—Sulphate of potash. Nineteen barrels of first size, four and a half seconds and four and a half thirds; making a total of twenty-eight barrels on half an acre, or at the rate of fifty-six barrels per acre.

On Plot No. 3.—Additional fertilizers. Twenty-three barrels of first size, five of second and four of third; making a total of thirty-two barrels on half an acre, or at the rate of sixty-four barrels per acre.

On Plot No. 4.—No extra fertilizer. Fourteen barrels first size, five of seconds and five of thirds; making twenty-four barrels from half an acre, or at the rate of forty-eight barrels per acre.

An analysis of the crop shows that the nitrate of soda produced

the largest potatoes ; that its yield of first size was nearly twice that of the sulphate of potash, but only about one-third more than H. J. Baker's fertilizer, while it more than doubled the plot which was only fertilized at the time of planting.

The use of the nitrate of soda produced the double amount of first size by an expenditure of 800 pounds per acre, while the expenditure of 800 pounds per acre extra of H. J. Baker's fertilizer only produced over one-third of first size more than No. 4, and the expenditure of 800 pounds per acre of sulphate of potash produced a little less than one-third more than No. 4.

That there was one-tenth less small potatoes from the sulphate of potash and extra potato fertilizer than from the nitrate of soda and single fertilizer.

A further analysis of the figures on the question of cost would develop the dearthness or cheapness of the various fertilizers used.

But, independent of cost, and for freedom from blight, and as a satisfaction in yield, especially in size, it would seem that the extra expense might be safely incurred in using nitrate of soda to some, if not to so large an extent as here used.

THE CULTURE OF POTATOES.

BY AARON SMOCK.

I thank you for this honor of addressing you, but as I look around me I see older men in this assembly—older in years and older in experience—than I am, and probably more capable of unfolding the successes of the culture of potatoes than I ; men from whom can be perhaps gathered better information upon the subject than can be obtained from this paper.

I will endeavor to explain, as near as possible, my experience as a potato-grower, for many instructive lessons can be gained through experience only. Chief among these is that good culture pays.

Much light is also thrown on the question of the amount of fertilizer that can be profitably applied. I have used, in the past two years preceding this, under favorable circumstances, 1,800 to 2,000 pounds of special potato manure per acre, with satisfactory profits. Still, no one should infer that stable manure is condemned. It must ever be the true foundation of good farming as conducted by the

great majority of farmers throughout our country ; but plant-food can be furnished, to the potato crop, at least, in a much better and more profitable form in properly-prepared fertilizers. Apparently, it is not so much the quantity, but the form in which the plant-food is furnished, that governs the yield, provided a reasonable amount is supplied. It is not a fertilizer altogether, however, which governs the yield, but attention, deep cultivation, often and continually. As aptly stated by L. H. Wilcox, as to what fertilizer to use, and that extensively, is "a judicious mixture of brains and elbow grease, and it must be used in the field and manufactured on the spot. It is of little value unless it is applied every day and every hour in the day, from sunrise until sunset, during the growing season ; in this way it is as efficacious as a patent medicine ; it will develop the plants and kill the weeds ; it will keep the ground loose and clean and destroy the insects and worms ; in short, it will make a success when everything else will fail." I am satisfied that if we all should use this we would succeed better. It seems to be the idea of some farmers to plant the crop and it will take care of itself, but not so ; we must do our share as thoroughly as we expect a fertilizer (or manure), sunshine and rain to do theirs.

Cutting the seed potatoes into sets of two eyes has given the best general satisfaction ; the method of simply cutting off the seed-end and planting the remainder has been practiced by some with remarkable success and is worth experimenting with where dry rot occurs. It is almost the universal verdict now, that it is better to select large or medium-sized tubers for seed purposes, because they are better developed in form, containing a larger proportion of starch and greater vegetative vitality than small tubers. Care should be taken as to the selection of the seed ; it should not be selected from a successive crop grown year after year, for the tubers become noticeably reduced until at last they will be undersized and weak. Whether the seed is planted whole or cut, it is preferable to have them sprouted before planting, but where seed is to be cut they should be cut before the sprouts start.

The depth of covering varies from two to seven inches, according to the character of the soil, variety of potatoes and time of planting. Seed planted before the weather becomes favorable often is chilled and rots in the ground and causes many blanks, and blanks mean a poor crop and no profits ; while a loamy soil will admit of deeper planting than a cold clay, and some varieties of potatoes can bear a deeper covering of earth than others.

In selecting our plot for potatoes we think it advisable to take a one-year-old sod, plowed to the depth of nine inches. If manure and marl are used, apply the manure broadcast in the fall preceding, and the marl at any time during the winter. If a commercial fertilizer is used, my experience has been to drill seven or eight hundred pounds broadcast per acre, drilling two ways, no earlier than the day before planting, and at the time of planting use about 300 pounds more distributed in the row. This gives the plants a good start, and to insure a good crop, when the plants are five or six inches high drill in five or six hundred pounds more of the fertilizer, being careful not to allow it to touch the foliage of the plant. This last application has given the best general results.

As to the cultivation: My practice has been, after they have been planted about two or three weeks I re-cover the rows with another furrow and immediately harrow them off level or nearly so. This operation is to kill the weeds and mellow the ground. In a few days the crop will be up and well started to growing. After this the plow is done away with and a one-horse cultivator is used entirely, narrowing the implement as the foliage of the plants grows; by repeatedly doing this until the growth of the vines prevents or the crop is matured, for frequent tillage gives rapid growth, which means tubers tender, bright and crisp, and slow growth is tough, dull and rusty.

A. S. LAMBERTSON ON GRASS.

The piece of ground on which this experiment was tried is a clay soil that has had no yard manure on since it was tilled for potatoes eight years ago. It had 400 pounds of commercial fertilizer on for potatoes and 300 pounds for wheat, when last tilled for these crops two and three years ago. It is the second year's mowing and the plot of about one and a half acres is divided into six equal-sized plots. Four were fertilized with sulphate of ammonia and bone black, complete fertilizer; and the nitrate of soda was sown broadcast both ways by hand at the rate of \$2.50 worth per plot; horse manure, three single-body loads, or about two tons, such as you would buy in town for \$1.25 per load. It was put on in the morning of April 7th and in the afternoon it rained. The other two plots had no fertilizer on them. When the fertilizer had time to take effect on the sulphate of ammonia and bone-black plot, the clover kept above the timothy until

it came in head, looking as if it suited clover better than timothy. While in the complete fertilizer and stable manure plots the timothy kept above the clover, while the nitrate of soda plot had no clover at all. On May 20th the plot fell down some and June 1st fell down badly and did not get up again, and I believe with half the quantity used the grass would have been just as good or better, as the spots where it was thinner and did not start so fast, stood up better and was the best grass. The grass was cut July 2d and carted in July 3d. The following table shows the kind of fertilizer used and the amount of hay taken from each plot :

	Pounds.
Sulphate ammonia and bone black.....	1,715
Yard manure.....	1,800
Nothing	1,550
Complete fertilizer.....	1,965
Nitrate soda	2,165
Nothing	1,490

The fertilized plots were fit to cut one week sooner than the plots not fertilized and were drier when cut, and all being cut and cured the same for convenience in carting; the plots not fertilized were not as dry at time of weighing as the fertilized plots.

Now as to the profits: The four fertilized plots had on 7,645 pounds, and to double the 3,040 pounds on two plots not fertilized to make the same size of fertilized plot, you will have 6,040 pounds, or you would have 1,565 pounds of hay for \$10 worth of fertilizer, first crop. But take the nitrate of soda plot with 2,165 pounds and plot by it unfertilized with 1,490 pounds and you will have 675 pounds of hay for \$2.50, or you will have 2,700 pounds of hay for \$10 worth of fertilizer the first year. The total amount of hay on the six plots was five tons and 685 pounds green hay and it weighed when sold November 1st, four tons and fifteen pounds.

DAVID BAIRD ON PEACH CULTURE.

To be successful in peach culture, certain conditions are important, viz., soil, varieties, cultivation, fertilizing and pruning. The soil should be well drained, as the peach will not endure wet feet; for this reason high, rolling lands even inclined to mountain sides with northern and western exposure make excellent sites. Good, clean culti-

vation from May until August is just as necessary as for corn or potatoes. Most soils suitable for the peach contain enough elements of fertility to answer the requirements of the tree until bearing age, when a fertilizer containing phosphoric acid and potash should be applied 300 to 600 pounds per acre of 400 pounds of bone meal and 200 pounds muriate of potash well mixed, or marl ought to supply these elements. Planters should exercise care in selecting varieties, there are several hundred in cultivation; some do much better in one locality than another; being sure of the varieties suited to your wants and markets, then insist upon having them. Buy only from reliable sources; don't try the costly experiment of planting cheap trees, cheap in the sense of their being a doubt as to whether they will produce the kind wanted. There are men in this town, possibly in this room, who know by experience the value of this suggestion; said one to me, "My orchard was a failure because I did not get varieties I bought." Said another, "I have noticed that early and late peaches bring the highest price; I am going to plant only two kinds, the very earliest and very latest," which he did; the earliest all rotted and the latest did not ripen. The money value of a crop depends very much on the grower; he must have a vigorous, healthy tree; fruit must be well thinned, either by pruning or hand-picking, one or both, to give it size and color; must be picked at right state, not too green nor yet too ripe to carry. Some fruits as the pear and our native plums are much improved in quality by ripening off the tree; the reverse is true of the peach. Profits vary according to supply. I remember about 1850 peaches were sold in the New York markets at 10 to 25 cents per basket; peaches from the same orchards a few years later brought \$2 per basket from the wagon at steamboat dock. I am looking for a general crop of peaches the coming season and expect remunerative prices, as the market is bare of all canned and evaporated goods.

W. R. WARD ON FRUIT TREES.

We certainly are being led into fruit culture more and more every year, and it is from the fact that we cannot compete with the Western wheat and corn farmers. To be successful with fruits, if they are to be grown for the market, the first thing essential is the choosing of the several varieties. This should be done with a view to extending over as much of the season as possible. Do not have more than you

can handle ripening at one time. It is better to have a few ready to send each week and have steady work all through the season, than to cultivate one variety and have a large quantity ripening at once, thus running the chance of bad handling in the necessarily-hurried gathering, with the probability of having the whole crop on the market at once in an inferior condition, and on account of careless picking. Choose a few good varieties, and when they ripen, one after the other, throughout the season, pick them carefully from the trees. Lift the fruit up to break it off, and not pull it down, for the lifting-up process breaks the stem easily, even if it requires more effort, while the pulling down, although more convenient, is apt to shake other fruit from the tree. Fallen fruit cannot help being inferior. Decay begins immediately in a bruise. I have employed ignorant help and have instructed them to pick my pears as if they were so many eggs. Never pack your fruit for the market in the orchard. It should be taken to the barn or some convenient place and sorted. Take every precaution here. Don't mix the varieties, either in baskets or barrels. Symmetry is a minor point.

We have come to the time when we must spray our fruit trees to save the crop from the ravages of the insect pests. It is so with the apples and pears, and soon it will be with peaches, too.

In closing, the speaker recommended the farmers in this section to experiment in the culture of fruit trees.

PRACTICAL BENEFITS FROM THE STATE BOARD.

BY D. D. DENISE.

What practical benefits do farmers receive from the State Board of Agriculture?

Practical benefit is distinguished from mere theoretical, in that it is capable of being turned to use or account.

In this respect our State Board is singularly helpful.

You may challenge careful examination of the subjects presented for the consideration of our annual meetings and will find them capable of being put in practice. Can any young farmer desiring information fail to be greatly benefited by studying the papers presented and the discussions had?

Here is a whole library of most valuable information, already

printed for the use of every farmer in the State if he desires to avail himself of the knowledge contained therein.

It is information from intelligent, practical farmers in their discussion of farm affairs, and in giving their experience in farm management. There is another feature of the work of the State Board which cannot be distributed, and that is the informal work, the work which does not get on the programme, which does not find its place upon the list, which takes place where little groups of men with a common interest, excited by something which has been said upon the platform, go there together and discuss in their own way, and with the freedom which gives interest to every such discussion, wherever it may be, the topics which have been presented. We find the most important work, the work that bears the best fruit, and that cannot be reported. In order to receive that benefit one must come to the meeting.

Agriculture occupies an immense field. It is a tree with many branches. We have given attention to one and to another as they seem to come up and be of present interest.

Attention to the improvement of farms, to raise them to a higher standard of cultivation, which is the only way to success.

We give attention to the health of our domestic animals, a question whose importance never dies out. We have given attention to various kinds of domestic animals, the breeds and their habits, an interest always large and important. We call attention to the horse; and there does not exist a man in our State who does not think he knows something about a horse, wants to know more and is interested in the question. The question of associated dairying presents a thoroughly practical side. A subject that is before the State Board each year. The dairy cow is an important element in our agriculture and we want to know how to make the very best possible use of her.

We have given attention to the farmer's life as well as to his work, to the education which he needs and should have, and to the means of providing it. We have given attention also to the legislation which the interest calls for.

Much attention has been given to the Experiment Station. The farmer of to-day cannot afford to be guided by blind guesswork. He needs a knowledge of facts; the knowledge of chemistry should be fairly well understood. The Experiment Station is doing a great work, and the more you study the results of their work the better fitted will you be to apply the same to your farms. There is no

industry where thought and intelligence pay better than on the farm. The present depression in agriculture is causing thousands of farmers to use their brains, and you can add materially to your store of knowledge by attending farmers' gatherings, especially the State Board. It is growing more evident that the farmer who follows the methods of twenty-five years ago cannot, as a rule, succeed. The great industrial and political changes which are going on, are many of them against the farmer. The farmers of this county must change their methods if they would prosper. A new agriculture must take the place of the old; these changes demand organization and co-operation.

It has always been difficult, and has by many been thought impossible for farmers to combine. But the pressure which is being brought to bear upon them, is forcing them to organize, and that is what the State Board is doing. It has come about under our form of government, that any organization which can control either much money or many votes, or both, can ordinarily get what it wants. As things have been in the past, farmers have voted for the candidates set up by the party leaders of their political parties without regard to their interest. A change should take place, and instead of blindly voting for the party candidates he should vote for men who are pledged to maintain his just demands.

Another great evil is lack of business co-operation among farmers. When a farmer has an article to sell, he goes alone to the buyer, who makes the price so he can make a large profit, but the farmer makes little or nothing. Buying as they usually do, each for himself, they pay all the agents' and other profits. It is thus evident that organization and co-operation are essential parts of successful agriculture.

The whole civilized world is advancing, intellectually, with grand strides, and in this land, especially, the agriculturists are lighting their State Board, County Boards and Granges with the torches of progress, and are shining brighter every year. Now, I know this in regard to these meetings, those and those only, get the fullest pleasure and benefit who, if possible, come at the beginning and stay through to the end. We might stay at home and work, and there is work enough to be done in all our homes, but if we were to stay at home and work all the time the work would not be done. Something would still be left for somebody else to do, and it is well to break away from work, from the drudgery and toil that come upon us every day and every hour that we stay at home, and meet those who have a common

interest with us, and from them gather fresh courage and stimulus for the work, rest ourselves and go back better prepared to take up the burden and carry it on again. The farmer needs every help he can get. He needs courage and enthusiasm. It is a blessing to get in the way of looking on the bright side of things and to learn to be thankful for the blessings God is giving.

THE OLD AND NEW FARMER.

The principal speaker of the afternoon was Mortimer Whitehead, Lecturer of the National Grange and Chief of the Division of Agriculture in the eleventh census, upon "The Old and the New Farmer." His address was divided under three heads—the farmer as a producer, a business man and a citizen. He dwelt for a time upon the importance of agriculture and then portrayed the different ways of farming—the old and the new. Years ago the farmer plodded along season after season in the same old way—planting his seeds and trusting in Providence for the rest. But to be a successful farmer to-day he must have brains as well as muscle. In the olden days the farmer had no farmers' club; he did not need it. To-day we have experiment stations, institutes, clubs, &c., and it is important for it to be so, when we know that every other industry in the country is organized. To-day we have 57,000 farmers' organizations, and last year, in the United States, there were one and a half millions of farmers' meetings.

The farmer of old, in some respects, was a better business man than the farmer of to-day. In the respect of disposing of his crop, he took direct to the market and was not at the mercy of the middleman, who takes commission off both ends and the middle too. We find now that the new farmer is educating himself, and these organizations are a benefit to those who are seeking the truth. He is becoming a better business man by co-operation and not employing some one to do his work. There is a good illustration of the co-operative system in creameries. The old way was for each household to churn its own butter, and there was the same preparation each week of the cream and the work of churning and washing the churn and drying it and putting it away. Now, one person goes around with a wagon and collects the cream and takes it to the creamery where it is all churned at once. The old farmers were not talkers. I remember a meeting which I conducted down here fifteen years ago. I couldn't

get any one to stand up to speak, and it was so with the farmers in every part of the country. To-day we hear them speaking whenever the opportunity affords. They don't have to get the lawyer or doctor to preside at their meetings as their fathers did. There is one thing, though, that the old farmer didn't have, and it were better if the new farmer didn't have it either—that is, the big blackboard covered with Sheriff's sales.

We are proud of the principle with which we started out in this grand old country—the equality of citizenship—but nowadays it makes a difference whether you live in a city or in the country, whether you are a banker or a farmer. The time was when the rural population outnumbered the people in the cities, but now it is not so.

New Jersey as a State is in a most unfortunate position, when the cities outvote the farming districts on any question. As long as the farmers are divided they can hope for no better treatment than that which they now receive. We are paired off, and the other fellow is elected and gets the perquisites and we have to pay the bills. We must learn to talk together, work together and vote together. The time has come when the farmer must take more interest in public affairs. He has not been active in this. In 1860 \$2 out of every \$3 of the nation's wealth (\$9,000,000,000) were in the hands of the farmers. Now the wealth is \$45,000,000,000, and the farmers hold only \$1 out of every \$3. Unfair and unequal legislation has done this. Two hundred Vanderbilts would control it all. I can name seventy lawyers who have more to say in the running of this government than all others put together.

The speaker was full of most interesting topics under this division of his address about the English capitalists who borrow money for two per cent. at home, and put it out here for six, seven, or anything they can get; the reciprocity, the taxes, the free laborers, the alien landlords of the West, who have bought a vast acreage of level, rich land, which only wants a drink of water to make it most productive, and they are now trying to get the government to irrigate it at the expense of the public.

Mr. Whitehead held his audience for two hours, and they were sorry when he stopped. He was tendered a most hearty vote of thanks. Following came a few earnest remarks from the Secretary of the State Board, complimenting this Board upon its good working condition and urging it on to still greater action.

MORRIS COUNTY.

MORRIS COUNTY BOARD OF AGRICULTURE.

OFFICERS FOR 1892.

President.....Hon. A. W. CUTLER.....Morristown.
Secretary.....W. F. ELY.....Madison.
Treasurer.....GEORGE COOK.....Hanover.

BOARD OF DIRECTORS.

M. M. COOK.....Hanover.
B. S. CONDIT.....Troy Hills.
J. J. MITCHELL.....Whippany.
H. W. YOUNG.....Afton.
S. M. HOPPING.....Hanover.
W. M. JAMES.....Afton.
ROBERT BLAKE.....Madison.
OSCAR LINDSLEY.....Morristown.
WILLIAM B. LINDSLEY.....New Vernon.

DELEGATES TO STATE BOARD.

D. A. HOPPING.....1892.
W. F. ELY... ..1892 and 1893.

ANNUAL REPORT.

The Morris County Board of Agriculture held its annual meeting at Afton on December 28th, 1891, and elected the above officers for the coming year.

The President, Hon. A. W. Cutler, presided. A larger attendance and more interest shown than ever known.

The President and the Secretary of the State Board were unable to attend and J. B. Rogers was called on to discuss the practical working of the new Road laws, which had been advertised to be discussed,

which fact brought out the farmers in full force to manifest the opposition they are showing in having the law carried out as it can be and was done in Chatham.

A number of townships of Morris and Essex were represented; reports were heard from Essex, Union, Somerset, Sussex, and Morris. Whereon no objections were made, it was from the townships where it seemed no attention has been paid to the new law. Hanover had a number who spoke of being satisfied with the new law, but this township had over forty Overseers appointed calling on the farmers, as has been formerly done, to do the work, and as was done in different townships in all the counties around us.

But how unfairly the new law can be managed is shown in the following two communications the Secretary read out of four he received.

(A few extracts are made from communication numbered 1, following this report.—Ex. Com.)

After the communications, a resolution was offered and unanimously carried, that a delegate should be sent from every township in the county to attend the Road Convention, to be held at Trenton on January 21st, to urge the farmers' claim of being allowed, if they wish, to work out their road tax, and which could be done if the amendment offered by our late representative, Hon. C. B. Meeker, was now passed, which was as follows:

“Provided, however, that any person who may so elect, shall be allowed to work part or all his road tax, and he shall give notice in writing, to the Township Clerk, within five days' after the annual town meeting, of his desire to work part or all of his road tax. On three days' notice by the Town Committee, their agent or superintendent, the party desiring to work shall attend in person or by substitute, to work at such time and place (not more than one mile from his residence) as the Township Committee, their agent or superintendent may direct.”

Accompanying the above are two communications relating to the manner of working the roads in Chatham township, under the Township Road law of last winter. The claim is made that the roads as worked under the Overseer system are much better with thirty-two road districts than as managed by the Town Committee, the township being divided into three districts under the control of three superintendents. The writer says, “Chatham would to-day be as they are in

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other townships, perfectly satisfied, had we shown the good sense and good judgment in electing such men for Town Committee as other townships have. I claim the present Road law itself is not so much of a failure, as we, the voters of Chatham, are the ones who have failed to elect men who should consider the public has some interest in our roads, and that they are placed in office for something besides their own gain." Another statement is "the present Road law, as now managed, is without exception the most outrageous and barefaced ring or clique ever known, in diverting our road money from those who pay it to the pocket of one of this Town Committee and his immediate family." The communication goes on to give the names of the Town Committee and others who, it is claimed, have perverted the public money raised for roads from its legitimate and equitable expenditure on the roads of the township to their own pockets. As this communication is so personal and local, the Executive Committee do not feel justified in inserting it in the annual report of the State Board. The remedy for the grievances complained of lies with the voters of the township, as the writer has said, and, on his own statement, the law cannot be charged with the incompetency or dishonesty of those whom the people elect. The law is giving good satisfaction when honestly executed.

SALEM COUNTY.

SALEM COUNTY BOARD OF AGRICULTURE.

OFFICERS.

<i>President</i>	RICHMAN COLES.....	Woodstown.
<i>Vice President</i>	EDWIN L. BORTON.....	Woodstown.
<i>Secretary</i>	H. C. PERRY.....	Friesburg.
<i>Treasurer</i>	J. WALTER PANCOAST.....	Sharptown.

DIRECTORS.

M. D. DICKINSON.....	Woodstown.
LEVI S. PRICKETT.....	Woodstown.
CHAS. R. LOVELAND.....	Cohansey.
ELMER GAUNT.....	Woodstown.
EMPSON ATKINSON.....	Woodstown.

DIRECTORS IN STATE BOARD.

ADAM S. GRAF (one year).....	Elmer.
EMPSON ATKINSON (two years).....	Woodstown.

MEETINGS.

The regular meetings of the Board are held on the fourth Wednesday in January, April, July and October.

The other farmers' organizations in the county are as follows:

WEST JERSEY AGRICULTURAL AND HORTICULTURAL ASSOCIATION.

<i>President</i>	OMAR BORTON.....	Woodstown.
<i>Secretary</i>	JAMES D. LAWSON.....	Woodstown.

SALEM COUNTY POMONA GRANGE.

<i>Master</i>	LEVI S. PRICKETT.....	Woodstown.
<i>Secretary</i>	M. D. DICKINSON.....	Woodstown.

SALEM COUNTY ALLIANCE.

President.....JACOB M. HITCHNER.....Friesburg.
Secretary.....A. R. THARP.....Friesburg.

WOODSTOWN GRANGE.

MasterAMOS PETERSON.....Woodstown.
SecretaryREBECCA D. BORTON.....Woodstown.

COURSES LANDING GRANGE.

MasterEMPSON ATKINSON.....Woodstown.
SecretaryEMMA J. STEWARD.....Sharptown.

FRIESBURG GRANGE.

MasterSAMUEL MICKLE.....Friesburg.
SecretaryCHARLES F. DICKINSON.....Cohansey.

CENTRETON ALLIANCE.

President.....JAMES GOLDER.....Centreton.
SecretaryW. W. GOLDER.....Centreton.

ELMER ALLIANCE.

PresidentWM. OVERS.....Elmer.
SecretaryH. H. NEWKIRK.....Elmer.

FRIESBURG ALLIANCE.

President.....LEWIS H. GARRISON.....Friesburg.
SecretaryA. R. THARP.....Friesburg.

UNION GROVE ALLIANCE.

President.....JOHN BEEBEVineland.
SecretaryHOWARD CREAMER.....Vineland.

ANNUAL REPORT.

BY H. C. PERRY.

Proceedings of the County Board.

The County Board has held four meetings in the past year, which have been fairly well attended and a good degree of interest manifested.

At the annual meeting in January, Prof. E. B. Voorhees, State Chemist, gave a lengthy and interesting address on the "Scientific Feeding of Farm Stock," which was well received and appreciated.

Some of the rations he gave have been tested by members of the Board, and have proved so satisfactory, I will give them here. They are as follows :

RATIONS FOR GROWING CATTLE, 2 TO 3 MONTHS.

No. 1.	No. 2.
30 pounds Clover Hay.	25 pounds Clover Hay.
5 pounds Wheat Bran.	8 pounds Wheat Middlings.
3 pounds Linseed Meal, O. P.	4 pounds Linseed Meal, O. P.

RATIONS FOR GROWING CATTLE, 3 TO 6 MONTHS.

No. 1.	No. 2.
20 pounds Clover Hay.	20 pounds Clover Hay.
8 pounds Wheat Bran.	8 pounds Wheat Middlings.
3 pounds Linseed Meal, O. P.	2 pounds Linseed Meal, O. P.

RATIONS FOR GROWING CATTLE, 6 TO 12 MONTHS.

No. 1.	No. 2.
20 pounds Corn Ensilage.	15 pounds Corn Stalks.
4 pounds Wheat Middlings.	10 pounds Wheat Bran.
6 pounds Corn Meal.	3 pounds Linseed Meal.
5 pounds Malt Sprouts.	
3 pounds Linseed Meal, O. P.	

No. 3.

20 pounds Clover Hay.
6 pounds Corn Meal.
2 pounds Linseed Meal.

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RATIONS FOR HORSES FOR SPEED.

No. 1.	No. 2.
10 pounds Timothy Hay.	10 pounds Timothy Hay.
10 pounds Oats.	10 pounds Oats.
6 pounds Wheat Bran.	6 pounds Dried Brewers' Grains.
2 pounds Linseed Meal, O. P.	1 pound Linseed Meal, O. P.

RATIONS FOR HORSES FOR FARM WORK.

No. 1.	No. 2.
12 pounds Timothy Hay.	10 pounds Mixed Hay.
6 pounds Corn Meal.	10 pounds Oat and Corn Meal.
1 pound Linseed Meal, O. P.	2 pounds Linseed Meal.
4 pounds Dried Brewers' Grains.	

RATIONS FOR FATTENING STOCK, FIRST PERIOD.

No. 1.	No. 2.
10 pounds Corn Stalks.	12 pounds Timothy Hay.
10 pounds Corn Meal.	10 pounds Corn Meal.
6 pounds Wheat Bran.	6 pounds Dried Brewers' Grains.
2 pounds Cotton-seed Meal.	1 pound Cotton-seed Meal.

RATIONS FOR FATTENING STOCK, SECOND PERIOD.

No. 1.	No. 2.
10 pounds Corn Stalks.	12 pounds Mixed Hay.
7 pounds Corn Meal.	6 pounds Dried Brewers' Grains.
9 pounds Wheat Bran.	5 pounds Corn Meal.
2½ pounds Cotton-seed Meal.	8 pounds Oat Straw.
	2 pounds Cotton-seed Meal.

RATIONS FOR FATTENING STOCK, THIRD PERIOD.

No. 1.	No. 2.
10 pounds Timothy Hay.	10 pounds Corn Stalks.
5 pounds Corn Meal.	6 pounds Wheat Straw.
6 pounds Wheat Bran.	6 pounds Dried Brewers' Grains.
8 pounds Oat Straw.	5 pounds Corn Meal.
3 pounds Cotton-seed Meal.	3 pounds Linseed Meal, O. P.

RATIONS FOR MILK.

No. 1.	No. 2.
6 pounds Corn and Oat Meal.	20 pounds Meadow Hay.
6 pounds Wheat Bran.	4 pounds Dried Brewers' Grains.
5 pounds Timothy Hay.	4 pounds Wheat Bran.
8 pounds Turnips.	1½ pounds Cotton-seed Meal.
5 pounds Shredded Corn Stalks.	
2 pounds Cotton-seed Meal.	

No. 3.

25 pounds Corn Ensilage.
6 pounds Wheat Bran.
3 pounds Corn Meal.
4 pounds Malt Sprouts.
3 pounds Linseed Meal.

After the address of Professor Voorhees, Mr. John Repp, a practical fruit-grower, of Gloucester county, gave a talk on fruit-growing.

At the April meeting Theo. F. D. Baker, of Cumberland county, addressed the Board on "Market-Gardening for Profit."

Prof. B. D. Halsted, State Botanist, also addressed the meeting on "The Diseases of the Sweet and White Potato."

At this meeting a committee was appointed to conduct experiments in spraying fruit trees.

The meeting in July was held in Elmer, when Secretary Dye, of the State Board, gave a very interesting address, subject, "What Next?" Also discussed the subject of corn culture. At the same meeting Dr. C. P. Atkinson, of Palatine, exhibited specimens of fruit and gave an instructive talk on the subject of spraying.

At the October meeting the committee appointed to experiment in spraying fruit trees reported favorably, although, owing to the large crop of fruit everywhere, whether sprayed or not, the result was not so marked as it might have been in some other seasons. E. Atkinson used one-quarter pound Paris green with fifty gallons water and was well pleased with the result. The committee was continued to make further experiments another year.

Professor Voorhees was also present at this meeting and gave a practical and instructive address on the economical use of fertilizers, paying especial attention to the sources of nitrogen. The Professor recommended buying the materials for fertilizers and mixing them at the farm instead of buying the fertilizer already mixed. He also advised the sowing of crimson clover as one of the cheapest sources of nitrogen.

Also at this meeting the Board of Directors were instructed to make arrangements for a Farmers' Institute the coming winter, should they deem it advisable. Accordingly it was arranged to have a two days' Institute in the Opera House at Woodstown on the 7th and 8th of January, 1892, when the following programme was carried out :

Opening address and words of greeting by the President, Richman Coles.

Address by Peter Peters, V. S., of Mullica Hill, Gloucester county. Subject, "The Inspection of Meat and Milk." He spoke of the great danger of transmitting disease from animals to the human family.

Report on the condition of agriculture in Salem county for 1891, by the Secretary, H. C. Perry.

An essay, "Within the Home and Around the Home," by Phebe F. Perry, of Friesburg.

The reading of an anonymous essay against the use of tobacco, by Ellen M. Coles, of Woodstown.

"Hints to Success in Poultry-Raising," by J. E. Barber, of Oakdale, Hunterdon county.

"Novelties at Fairs," by Samuel R. Downing, West Chester, Pa.

"The Farmer in Politics," by Linton Satterthwait, Trenton.

"Horse-Breeding Profitable," by Clark Pettit, Salem.

"Sweet Potato Culture," by B. F. Straughen, Pedricktown.

"Growing and Marketing Fruit," by Woodnutt Pettit, Salem.

The Institute was conducted by Franklin Dye, Secretary of the State Board. Besides the above addresses many other subjects of interest to farmers were discussed, and at the close all felt that the two days had been both pleasantly and profitably spent, and this the first Farmers' Institute in Salem county was pronounced a success.

(Causes contributing to the success of the Institute besides the excellent addresses made were the large attendance, filling the body of the Opera House at each session; and the active part taken by the home talent in discussing the subjects presented.—F. DYE.)

CROP REPORT.

The season just closed has been one of good crops, generally, in this county, with the exception of hay, which did not come up to the average. Corn is one of the leading crops and was above the average. Wheat has been about an average and the price of both fairly good. Rye and buckwheat are not much grown. Oats have been a much better crop than last year when they were almost a failure.

Potatoes were planted earlier than usual to escape the rot, as, last year, the late-planted rotted worse than the early; they have not rotted badly this year but the price has ruled low with a very dull market. Sweet potatoes have not been quite up to the average. Fruit of all kinds, especially apples and peaches, has been more abundant than for many years, and prices low, in some cases not enough to pay for marketing. Truck of all kinds has been plentiful and cheap. To sum up, plenty of produce but little money.

CONDITION OF AGRICULTURE.

Two of the leading crops of Salem county being wheat and corn, and by reason of better crops and prices for the same, agriculture may be said to be in a little more prosperous condition than last year, although the main discouragement seems to be not the failure of certain crops but in the prevailing low prices. Another discouragement is the scarcity and inefficiency of farm help. Allured by the attractions of city life and the greater inducements offered by factories, canneries, &c., the best help has been gradually leaving the farm and seeking employment in cities and towns. The wages paid farmhands range from \$14 to \$22.50 per month and board.

Owing to rust attacking the oats while they are starting out in head they have been a poor crop for several years, and consequently are receiving less attention than five years ago, tomatoes and potatoes taking their places in the rotation of crops. Sweet potatoes, small fruits and vegetables are receiving more attention than formerly in sections of the county where the soil is adapted to their successful cultivation. In portions of the county better adapted to grass and grain the dairy is receiving more attention than formerly, thereby showing advancement by growing those crops to which the soil is best adapted.

The spraying of fruit trees and vines to destroy injurious insects is on the increase, several having tried it the past season with success. The farmers, too, are taking more interest than formerly in the subject of improved roads.

If farmers would organize for their mutual benefit and co-operate in buying and selling, think more, study and learn the quality and needs of their soil and its adaptability to grow certain crops, and then apply themselves to the growing of such as are adapted to their soil

and the markets near which they are located—in short, apply the same business principles in their farming operations as the merchant or manufacturer does to his, they would to a great extent improve their condition and advance their interests. The farmers are taking a deeper practical interest in the subject of farmers' organizations, having at the present time in the county three subordinate Granges and four subordinate Alliances, besides a County Grange and County Alliance. The West Jersey Agricultural and Horticultural Association is a large and flourishing society, holding an annual fair, which has been instrumental in improving the stock of the county. Now our fine herds of cattle and horses will compare favorably with those in any part of the country.

One of the greatest needs of agriculture to-day is education; not that the farmers should have merely book-learning, but a practical knowledge of their business, the same as they would need if they were to engage in any other occupation. Educated to the necessity of organizing for mutual benefit; educated to good citizenship and ability to hold any office in the gift of the nation; educated to respect themselves and thereby command the respect of others; then can they take their proper place, side by side with those in other callings, on an equal footing with all. Then will the farmer receive a just compensation for his labor, and agriculture be placed, where it properly belongs, in the front rank, as well as being the foundation of all other industries.

SOMERSET COUNTY.

SOMERSET COUNTY BOARD OF AGRICULTURE.

OFFICERS FOR 1892.

<i>President</i>	HON. WM. J. KEYS.....	South Branch.
<i>Vice President</i>	D. C. VOORHEES.....	Blawenburg.
<i>Secretary</i>	A. P. SUTPHIN.....	Somerville.
<i>Treasurer</i>	RYNEAR STATTS.	

BOARD OF DIRECTORS.

Bedminster Township.—AMOS C. SUTPHEN, WILLIAM C. LANE.
Bernards Township.—JOHN M. HOLMES, JOHN A. LAYTON.
Branchburg Township.—ABRAM DU MONT, JOHN G. SCHENCK.
Bridgewater Township.—STEPHEN E. GARRETSON, BERNHARD MEYER.
Franklin Township.—A. V. D. POLHEMUS, PETER J. STAATS.
Hillsborough Township.—GEORGE V. N. VEGHTE, PETER J. QUICK.
Montgomery Township.—JOHN A. BROKAW, PETER S. VOORHEES.
North Plainfield Township.—GEORGE W. BULLMAN, A. P. VOORHEES.
Warren Township.—THOMAS C. BIRD, ISRAEL C. ADAMS.

The (new) County Board of Agriculture was organized on January 15th, 1892, when a part of the officers and two delegates to the State Board were elected.

The organization was completed on March 12th, when an earnest and well-attended meeting was held, and the new Board started on its course of usefulness to the farmers of Somerset county.

A statistical report for the county was made up from reports sent from a number of townships, which is embodied in the State Statistical Report. (See page 40.)

Answers to questions sent out by the Executive Committee of the State Board are summarized as follows :

SOMERSET COUNTY.

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There is but little improvement, if any, in the price of land.

Farm laborers are on the decrease—are seeking work in towns, factories, railroads, &c.—and yet wages are higher than they were years ago.

Potatoes, rye, hay, peaches and truck are receiving more attention as farm crops.

Comparatively no attention has been given to spraying fruit trees and vines, to preserve fruit against the ravages of insects, while in the matter of improved roads a decided interest is manifested.

It is suggested that farmers as a class could improve their condition and advance their interests by organizing; buying and selling together (co-operation); live within their means; get out of some of the old ruts; work harder and save more.

The *greatest* need of agriculture at present is thought to be an education that will enable farmers to plant, fertilize and care for their crops understandingly, and not trust to Providence altogether and go it blind. Better help; more thorough tillage; better markets; better farmers.—F. DYE, *Secretary*.

SUSSEX COUNTY.

SUSSEX COUNTY BOARD OF AGRICULTURE.

OFFICERS FOR 1892.

<i>President</i>	HON. THOMAS LAWRENCE.....	Hamburg.
<i>Vice Presidents</i>	{ L. H. S. MARTIN.....	Frankford.
	{ OSCAR DUNN.....	Deckertown.
<i>Treasurer</i>	THOMAS ARMSTRONG.....	Deckertown.
<i>Secretary</i>	E. N. MILLEN.....	Deckertown.

DIRECTORS.

Hon. WM. OWEN.....	Owen Station.
B. K. JONES.....	Beaver Run.
L. H. S. MARTIN.....	Frankford.
S. SLATER.....	Lafayette.
J. F. MARTIN.....	Deckertown.
GARRETT GUNDERMAN.....	Hamburg.
H. C. CLARK.....	Newton.
CHAS. GARDNER.....	Andover.
P. D. SMITH.....	Byram.
WM. HARDEN.....	Hampton.
DAVID WARBASE.....	Hunt's Mills.
WARREN C. HURSH.....	Sandyston.
JAMES RUNDLE.....	Montague.
JACOB ROE.....	Branchville.
CHAS. WINTERMUTE.....	Stillwater.

DELEGATES TO STATE BOARD.—Judge L. J. Martin, one year; Hon. A. J. McBride, two years.

REPORT BY THE SECRETARY.

The untiring efforts which Secretary Dye has all along put forth in the interests of our farmers, culminated this year in his securing for us as lecturer at our annual meeting ex-Governor W. D. Hoard,

of Wisconsin. Not a better man could have been selected to talk to the farmers of this section, where dairy interests predominate. The speaker handled his subject, "The Breeding, Handling and Feeding of Dairy Cattle," with rare skill, and many a practical lesson was lodged in the minds of his hearers. The day was unfavorable, but a goodly number of representative farmers were out to the afternoon session, and in the evening one of the largest gatherings which the County Board has yet succeeded in calling out listened with marked attention to all that was said. Secretary Dye, in an interesting way, outlined the work of the State Board, and called attention to some needed reforms in the line of improving the condition of the farmer. The public schools were, he said, educating away from, not toward the farm. Teachers qualified to teach the branches which young farmers should be familiar with cost too much for the Board of Education. More young men should avail themselves of the opportunities offered in the free course of lectures on agricultural topics offered by the State College at New Brunswick. The older people have the agricultural press and agricultural institutes, which they should make the most of. The educated and thinking people are the leaders in the land. Farmers were urged to a greater interest in the public schools, and the necessity for compulsory education was shown. There is too little benefit derived from the money expended for public education, through the non-attendance of the children.

Attention was called to the influence of the State Board in legislation and in the way of public improvements. The increased interest in institute work was remarked. The State is getting waked up as to its agricultural interests.

Among other things which looked promising to the farmer's profits Secretary Dye suggested sheep-raising. This is an industry too much neglected among the hills of Sussex, which afford pastures peculiarly well adapted to the production of mutton and wool.

Ex-Governor Hoard called attention to some of the abuses of the dairy industry. He had noticed, by the way, cattle on the cold hill-sides that should have been in cosy stalls. In some instances they were standing around hoof-deep in the snow. Man made stock-in-trade of the cow's maternity, and he was unwise and inhuman if he abused her. The best cows came from countries where women were the care-takers. Farmers were advised to grow more of the nitrogenous foods which now cost them so much money. Peas were a good

and cheap food and can be grown almost anywhere. A comfortable and convenient stable was described, and his advice was to keep the cows in it most of the time in winter. A cow giving a large mess of milk is working harder than a plow-horse, and don't need much exercise of any other kind.

Supply and demand will always be the main factors in fixing the price of milk. The farmer can accomplish most by working his own end of the line in lessening the cost of production. Use plaster in the stable and to save the fertility which is too often allowed to waste away. Ninety-eight per cent. of the ammonia voided by the cow is in the urine. Ammonia is the most expensive element of fertility in which the farmer deals. Milk-selling is exhaustive to the soil, and all the fertility should be husbanded.

Land-plaster is cheap, keeps the stable sweet and the milk free from taint, and a \$1.60 barrel of it saves \$48 worth of ammonia.

The dairy cow has a largely-developed nervous system, similar to that found in the highly-organized race-horse. Maternity is her special function. The beef animal is a miser—what she eats goes on to her back. Form governs function. The typical dairy cow must have a good brain. The brain is the center of the nervous system. The coupling of the neck with the head must be strong. The ribs should be like the rafters of a roof, not springing out abruptly, and they should be wide apart. The backbone large, so as to carry a large spinal marrow. Milk is made from the blood. Large lungs best oxidize the blood. Large nostrils should go with well-developed lungs. Look for a broad, open muzzle. The pelvic arch should be marked; the back not straight, as in the beef animal. A Holland rule holds that the bone of the tail should reach below the back. This indicates a large spinal column. The udder should extend well under the abdomen. The larger the surface of attachment of the udder to the body the better. This gives a long line of absorption. A large navel development indicates a strong constitution, an essential in a good dairy cow. The speaker pronounced the teats one of the greatest of blessings to the milk-producer. It would take too much space to repeat here all the points he made in favor of good breeding, feeding and care. There was "milk" in every word of it, and those who heard Governor Hoard's lecture carried away with them much food for future reflection.

The officers and members of the Sussex County Board and the

members of Pomona Grange, who showed commendable zeal in raising funds, have the thanks of the Secretary for the hearty support which they gave in rendering this meeting such an unqualified success.

CROPS.

An increase of about 20 per cent. over last year is reported in the corn crop, and the average price is estimated at 80 cents. Average yield, 60 bushels per acre. Wheat shows an increase of 10 per cent., and sells at an average price of \$1. Yield per acre about 17 bushels. Rye has yielded about 10 per cent. above the average, estimated at 20 bushels per acre. It is worth at present about 90 cents per bushel. The oat crop shows an increase of at least 20 per cent. Average price, 50 cents. Yield per acre, 30 bushels. Buckwheat, especially the Japanese, has yielded unusually well. Price, 50 cents per bushel. Hay has been a short crop, about 70 per cent. of the average of the past few years. Value, \$14 per ton. Potatoes show an increased yield of say 30 per cent., and are bringing an average of \$1.25 per barrel. Apples have been quite plentiful in some sections of the county the past season, and in others below the average. The majority of reports, however, show an increase of 50 per cent. The average price for good, marketable fruit is about \$1 per barrel. Berries are little grown for market in this county. The only report at hand, that for Wantage township, claims strawberries a 75 per cent. crop, and blackberries a full one. Vegetables are not grown to any considerable extent for other than home consumption. Winter grain looks well. Both rye and wheat were sown late this year on account of drought.

STOCK.

Colts from one to three years old are valued at about \$75. Mature horses average \$140. While mules are considered by some very handy and economical as a second team on a farm, oxen are still more in favor for this purpose with the majority, and mules are not used to any great extent. None are reared in this county. They cost about 10 per cent. more than horses. About the same number of cows are kept in the county as in preceding years. The value of an average milch cow is about \$30. Young cattle, from one to three

years old, are worth from \$18 to \$20. Veal calves are reported a little below the average in number, and are worth between six and seven cents for the season.

Some townships report few if any sheep kept; others are up to the average of preceding years, and in other cases an increase is reported. More sheep are kept in townships remote from railroads than in sections where milk-selling is made a specialty.

Store sheep (fall) are valued at \$4; spring lambs at \$5.

Butchers complain of a scarcity of good mutton; there is not enough to fill the local demand. Sandyston reports ten sheep killed by dogs.

Swine-growing shows an annual decrease, many farmers who sell milk buying what pork is necessary for their own tables. Much less pork is consumed in farmers' families than in former years. The cows and chickens, where milk is sold, consume the food which used to go to the hogs.

The average price for pork for December is five and three-quarter cents.

More poultry is grown than in former years. The increase may be safely estimated at 25 per cent. Chickens, in November and December, are bringing an average of eleven cents; turkeys, twelve cents.

From all parts of the county come reports of a steady decrease in the value of farm lands. A depreciation of \$5 an acre in the past three years is the estimate made by several careful observers.

There is an increasing scarcity of good tenants. A few years ago the tenants sought the farms, now there is a rivalry among landlords as to who shall get the desirable tenants. Greater inducements are made than were necessary a few years ago in order to get and hold good tenants. More farms are held for rent than formerly, and many of the class of men who used to rent have drifted into other kinds of business.

The number of farm laborers is evidently on the decrease. It is growing more and more difficult for farmers to get good help both outside and in the house. The railroads and the factories attract the young people. They find the towns more interesting than the farm; the labor is often lighter and wages better. Those in other branches of business can afford to pay them more for their labor than the farmer can. Wages are about the same that they were five years ago.

A good farm laborer gets, on an average, \$18 and board for the season, say from April 1st to December 1st. For the remaining four months he gets from \$10 to \$12 and board. This cut in wages during the winter season may be mentioned here as one of the reasons why farm laborers seek other employment. As team-drivers, &c., they can earn full wages the year through.

Grain-growing is receiving less attention in this county than formerly. There is a tendency to plow less and cultivate more highly the best acres on the farm. Grass and fruit-growing are receiving increased attention.

Diminished productiveness and small profits, owing to Western competition, have both had an influence in discouraging grain-growing in this section. In the average year, grain can be purchased here as cheaply as it can be grown.

One cause of diminished productiveness comes of trying to farm too much land. The fertility taken from the land in the crops is not fully restored to it, and farm and farmer both grow poorer. The way in which the manure is mismanaged in the average barn-yard is sufficient in itself to explain why farming does not pay. This is the big leak through which many a hard-working farmer's profits go. Professor Q. P. Roberts, of Cornell University, estimates the loss from this source to be, on the average farm, not less than \$1 per day. Observation strengthens the belief that he has not placed the figure any too high.

Farmers are taking an increasing interest in the subject of improved roads. The advent of the road-machine has been a blessing to us, and our highways, always the best in the State, despite their hilliness, are better than ever before.

The majority of reports from various parts of the county testify that our farmers are not taking a deeper interest in organization. This is to be regretted, for in union there is strength.

Among the many means suggested for bettering the condition of the farmer may be mentioned "economy," "co-operation," "special legislation" and "the practice of improved methods of agriculture."

In reply to the question, "What is the greatest need of agriculture to-day?" the following answers were given by representative farmers: "Direct sales of produce to consumers," "Cheaper transportation," "Pro rata freight rates," "Reduction of interest rates," "Cheaper money," &c., &c.

UNION COUNTY.

UNION COUNTY BOARD OF AGRICULTURE.

OFFICERS FOR 1892.

<i>President</i>	DENNIS LONG.....	Irvington.
<i>Secretary</i>	DENNIS C. CRANE.....	Westfield.
<i>Treasurer</i>	ROBERT WOODRUFF.....	Westfield.
<i>Librarian</i>	DENNIS C. CRANE.....	Westfield.

DIRECTORS.

GIDEON LUDLOW.....	Cranford.
OGDEN WOODRUFF.....	Elizabeth.
JAMES W. HIGGINS.....	Elizabeth.
DAVID MAGIE.....	Elizabeth.
D. B. WADE.....	Union.
DENNIS LONG.....	Irvington.
DENNIS C. CRANE.....	Westfield.
ROBERT WOODRUFF.....	Westfield.

DELEGATES TO STATE BOARD.

DENNIS C. CRANE.....	Westfield.
NOAH W. PARCELL.....	Elizabeth.

ALTERNATES.

BENJ. W. TUCKER.....	Linden.
OGDEN WOODRUFF.....	Elizabeth.

ANNUAL REPORT.

During the past year we held eight Board meetings and one picnic. Seven were held in the County Court House, Elizabeth, and one, an all-day meeting, in Westfield. The interest manifested is about on a par with former years.

At the Westfield meeting we had with us Hon. Franklin Dye, Secretary of the State Board of Agriculture, and Professors Voorhees and Smith, of the State Agricultural College, and Mr. B. C. Sears, Superintendent of the College Farm. Steps have been taken to have a course of lectures on agriculture by Professor Voorhees in the near future.

WARREN COUNTY.

WARREN COUNTY BOARD OF AGRICULTURE.

OFFICERS FOR 1892.

<i>President</i>	WM. FRITTS, Esq.....	Washington.
<i>Vice President</i>	M. C. FLOMERFELT.....	Danville.
<i>Secretary</i>	ALBERT SILVERTHORN.....	Delaware.
<i>Treasurer</i>	SAMUEL READ.....	Mt. Hermon.

DIRECTORS.

JNO. H. ALBERTSON.....	Belvidere.
EMANUEL SNOVER.....	Blairstown.
JAS. C. CYPHERS.....	Hope.
JAMES BEATTY.....	Stephensburg.
JAS. D. VANNATTA.....	Roxburg.
WILLIAM SHERRER.....	Springtown.
JOHN T. OBERLEY.....	Broadway.
E. J. BILBY.....	Hackettstown.
HIRAM F. COOK.....	Allamuchy.

DELEGATES TO STATE BOARD.

JONATHAN BILBY (one year).....	Hackettstown.
WM. O. WARD (two years).....	Hainesburg.

FARMERS' PICNIC ASSOCIATION.

<i>President</i>	WM. FRITTS	Washington.
<i>Secretary</i>	M. C. FLOMERFELT.....	Danville.
<i>Treasurer</i>	A. LEIGH.....	Danville.

WARREN COUNTY FARMERS' ALLIANCE AND INDUSTRIAL UNION.

<i>President</i>	ALBERT SILVERTHORN.....	Delaware.
<i>Vice President</i> ,	J. W. C. FLEMING.....	Danville.
<i>Secretary</i>	M. C. FLOMERFELT.....	Danville.

HAINESBURG, No. 44.

PresidentA. SILVERTHORN.....Delaware.
Secretary.....ANDREW N. VAN HORN.Hainesburg.

WASHINGTON, No. 45.

Secretary.....JOHN MORRISON.....Washington.

DANVILLE SUB-ALLIANCE, No. 46.

PresidentJ. W. C. FLEMING..... Danville.
Secretary.....M. C. FLOMERFELT.....Danville.

HACKETTSTOWN, No. 47.

PresidentE. J. BILBY.....Hackettstown.
Secretary.....C. A. STEPHENS.....Hackettstown.

MT. HERMON ALLIANCE.

PresidentJOHN FLOMERFELT.....Mt. Hermon.
SecretaryWILBUR BRANDS.....Mt. Hermon.

ASBURY ALLIANCE.

(Officers' names not received.)

WARREN GRANGE.

Master.....N. WARNE.....Broadway.
Secretary.....W. F. PURCELL.....Broadway.

POHATCONG GRANGE.

Master.....D. C. DONNELLY.....Springtown.
Secretary.....A. A. PAINTER.....Shimer.

WARREN COUNTY.

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ANNUAL REPORT.

While the yield of most crops during the past year has been good, prices in the main have been low, with the exception of grain, which advanced during the fall and early winter. Farms are still declining in price, and farm hands are on the decrease, owing perhaps to the desire to concentrate their day's work into fewer hours, and that they may enjoy social intercourse more freely. The advantage of higher wages in cities and factories is not so great as it seems when compared with many other privileges to be had in the country, and farmers are paying higher wages than formerly. Crops are changing somewhat, and more potatoes and fruits are being planted, while grain, oats, especially, is falling off. This is owing to decreased productiveness and small profits. No attempt has been made to grow perfect fruit by spraying to destroy insects. A forward movement should be made by our fruit-growers in this direction, as imperfect fruit will not command so high a price as smooth and well-developed fruit will.

Our farmers are taking more interest in the subject of improved roads.

It is thought farmers might be able to improve their condition by joining the Farmers' Alliance and Industrial Union. That they are taking a deeper interest in the subject of co-operation is evidenced by the number of organizations formed. Lower rates of interest and lower freight charges would be a great assistance to our producers.

COUNTY BOARD MEETINGS.

There has not been as much interest shown at our meetings and the attendance was not so good as formerly. The farmers' picnic at Belvidere, N. J., was the greatest gathering of farmers and laborers that has ever been known in Belvidere or anywhere in the county. It was estimated that there were from 12,000 to 15,000 people in attendance. Mr. J. T. Willets, of Kansas, sounded the keynote and gave reasons for farmers' organizations, and since these alliances have been organizing there is more interest shown in our County Board meetings, and steps have been taken to hold a Farmers' Institute of two days' session, in co-operation with the State Board, in Belvidere early in January.

LEGISLATION REQUESTED.

The following resolutions were passed unanimously by the Board :

"Resolved, That all public officers in the State of New Jersey, both State and judicial, and in all departments of State, and all appointments made by the Governor of the State of New Jersey, and all salaries that have been or are fixed by the Senate and General Assembly of the State of New Jersey, where such salaries exceed fifteen hundred dollars (\$1,500) annually, such salaries shall be reduced to one-third the amount annually, whatever the amount of such salaries is, and the saving of this reduction to be applied to public schools and State asylums, but not to increase the expense of asylums or schools. This is to reduce taxes generally. All property, real and personal, to be assessed at the assured value.

"Resolved, That hereafter the legal rate of interest in New Jersey shall not exceed five per cent. annually, and any person accepting over five per cent. annually per dollar, directly or indirectly, shall forfeit the principal.

"Resolved, The present Road law to be amended so that the people elect the Supervisors, as under the old law, Supervisors to purchase gravel to be put on the roads, where good gravel can be obtained, not to exceed six cents per two-horse load and not over three-quarters of a mile distance to draw.

"Resolved, That a copy of these resolutions be sent to our Senator and Representatives, and to the State Board of Agriculture."

SUGGESTIONS.

It is suggested that the Dog law be amended so as to give better protection to human life and to all kinds of stock, and giving the person or persons the right to kill the dog or dogs when destroying or worrying the same.

That the Trespass law be amended so that people can have better protection from trespassers who steal fruit, nuts, &c., and tear down fences, and leave gates and bars open. And give the proprietor, manager or tenants power to arrest while on their property.

REPORT

OF THE

American Cranberry Growers' Association.

1892.

*REPORT OF THE AMERICAN CRANBERRY GROWERS' ASSOCIATION.

Gentlemen—The last season has not been a favorable one for cranberry-growers.

Notwithstanding the cutting off of nearly the entire Western crop by frosts and other casualties, the increase of the Eastern crop, especially the New England crop, was so large as to overbalance a supposed shortage and make it one of the largest crops on record.

Since a short period after the market opened, and before the extent of the crop became manifest, prices were so low as to leave the grower no profit for his labor and capital invested, and in many cases he would have been better off had he allowed the crop to remain unharvested.

Fears are entertained, and the experience of the last year gives good ground for them, that we have reached the point of overproduction in cranberries, and, unless something can be done to open foreign markets for this fruit, the prospect is not a bright one, to say the least, for this important industry.

Government aid has been extended to our producers of meats and cereals in opening and re-opening foreign markets; why should not fruit-growers receive like consideration? The cranberry-grower takes lands that for other purposes are valueless and makes them the most productive of any, giving employment to thousands, who, without this industry, would want for bread, and adding materially to the wealth and producing power of the State.

The crop of New Jersey for 1891 aggregated 250,000 bushels, and was distributed as follows:

Atlantic county.....	35,000 bushels.
Burlington county.....	128,000 “
Camden county.....	15,000 “

* Report received too late for insertion in the usual place.—SECR.

STATE BOARD OF AGRICULTURE.

Cumberland county.....	3,000 bushels.
Gloucester county.....	6,000 "
Middlesex county.....	5,000 "
Monmouth county.....	11,000 "
Ocean county.....	45,000 "
Salem county.....	2,000 "
Total.....	250,000 "

An increase over the crop of 1890 of 25 per cent.

The New England crop aggregated 471,000 bushels, or an increase over the crop of 1890 of over 202,000 bushels, or 75 per cent.

The Western crop was decreased about 85 per cent. and only aggregated about 30,000 bushels.

The crop of the country for 1891 would stand in round numbers as follows :

New Jersey.....	250,000 bushels.
New England.....	480,000 "
The West.....	30,000 "
Total.....	760,000 "

The annual meeting of the Cranberry Growers' Association was held at the American House, Trenton, on Tuesday, January 19th, 1892.

The subject of a cranberry congress for 1893 was discussed and referred to the Executive Committee with power to act.

The Treasurer's report showed receipts for the year for dues and membership, \$191; balance from last year, \$17.38; total, \$208.38. Disbursements, \$235.90; leaving a balance due the Treasurer of \$27.52.

The accounts were audited and reported correct.

The following officers were elected for the ensuing year :

PRESIDENT.

Dr. J. H. BRAKELEY.....Bordentown, N. J.

FIRST VICE PRESIDENT.

Hon. THEO. BUDD.....Pemberton, N. J.

SECOND VICE PRESIDENT.

C. L. HOLMAN.....Lakewood, N. J.

SECRETARY AND TREASURER.

A. J. RIDER.....Trenton, N. J.

Dr. J. H. BRAKELEY.....Bordentown, N. J.
A. J. RIDER.....Trenton, N. J.

J. H. BRAKELEY.

A. J. RIDER.

THEO. BUDD:

O. M. HOLMES.....	Mashpee, Mass.
GEO. J. MILLER.....	Hyannis.
W. H. UNDERWOOD.....	Harwich.

D. C. SPENCER..... Old Saybrook.

Jno. M. Rounds.....Providence.

GEO. ROE RAYNOB.....Manorville.

S. H. COMINGS.....St. Joe.

R. C. TREAT.....Meadow Valley.

Egg Harbor.....	J. E. P. ABBOTT.
Galloway.....	J. E. P. ABBOTT.
Hamilton.....	JOHN T. IRVING.
Hammonton.....	E. VAN HISE.
Mullica	{ JOHN T. IRVING and A. CARNEY.
Weymouth	S. M. CHAMPION.

Bass River.....	A. SATTEETHWAITE.
Egg Harbor.....	
Evesham.....	JOS. EVANS.
Medford and Randolph.....	JOSHUA S. WILLS.
New Hanover.....	{ GEO. L. SHINN,
	{ J. H. BRAKELEY.
Pemberton.....	THEO. BUDD.

REPORT

OF THE

STATE ROAD CONVENTION.

JANUARY 21, 1892.

(541)

PROGRAMME.

The subject of the improvement of the public roads of New Jersey having been a prominent one in the discussions of the State Board of Agriculture for years past, and as some important Road laws have been secured through the efforts of the Board, and other road legislation suggested, the Executive Committee approved the proposition to devote one session to the consideration of this subject, and to make the invitation general and the meeting itself distinctly a Road Convention for the whole State. Accordingly the Convention was called and the following programme prepared, subject to such changes as the Convention might deem wise :

NEW JERSEY STATE ROAD CONVENTION.

A State Road Convention is called, under the auspices of the State Board of Agriculture, to meet in the State House, Supreme Court room, at 2 o'clock P. M., January 21st, 1892.

Gentlemen have been engaged to speak as follows :

The value of good roads. Dr. James C. Mackenzie, Lawrenceville.

European *vs.* American roads. Hon. Thomas Dudley, Camden.

Location and building of roads. Gen. Elias Wright, C.E., Atlantic City.

Need of engineering skill in permanent road-building. Robert A. Meeker, C.E., Plainfield.

Suggestions from experience and observation in road-building. Chauncey B. Ripley, LL.D., Westfield.

Construction and repair of country roads. James Owen, C.E., Newark.

Cost of maintaining roads under present methods compared with proposed plans, and State aid necessary in building leading roads.

Judge Alfred Reed, Trenton, and Clayton Conrow, Esq., Moorestown.

Incongruity and inefficiency of existing Road laws. Ex-Judge Wm. M. Lanning, Trenton.

The subject will be presented and discussed as indicated above, and in its various other relations to nineteenth-century advancement; gentlemen of all professions are invited to attend and participate in the discussions, as the road and street question is a matter of general concern.

The Convention is called in the hope of evolving some plan for permanent improvement of the public highways of the State; for such a general expression of views as will lead to and suggest needed legislation; and, if thought best, to organize a permanent State Road Improvement Association. There will be committees appointed as may be deemed necessary. The Convention will hold two sessions on Thursday and continue into the following day if found to be advisable.

Numerous letters have been received from prominent gentlemen throughout the State indorsing the Convention.

In addition to the above list of speakers, Mr. Isaac B. Potter, of New York; Mr. C. H. Luscomb, Park Commissioner, Brooklyn; Mr. Jas. R. Dunn, of Ohio, President L. A. W.; Major Chas. L. Burdett, of Connecticut, First Vice President L. A. W.; Chas. C. McBride, Elizabeth, N. J.; Mr. Frank Bergen, Elizabeth; Mr. W. T. West, Roselle, and many others will make addresses and take part in the discussions.

N. B.—The New Jersey State Board of Agriculture will convene at the State House on January 19th, and continue until the Road Convention is called. Persons expecting to attend either are cordially invited to attend both meetings.

FRANKLIN DYE,
Secretary.

STATE ROAD CONVENTION.

TRENTON, New Jersey, January 21st, 1892.

The State Road Convention was called to order by Hon. Edward Burrough, President of the State Board of Agriculture.

A call for the nomination of Chairman resulted in the nomination of Chauncey B. Ripley, LL. D., of Westfield, N. J., when Mr. A. W. Cutler stated he desired to see the Convention under the control of the State Board of Agriculture, and made a motion that the President of the State Board, Hon Edward Burrough, act as President of the Road Convention. This motion prevailed, and the Secretary of the State Board was also elected Secretary of the Road Convention.

Mr. Burrough—I desire to state to the Convention that I am not insensible to the compliment paid me, but I wish it distinctly understood that the State Board will not, in any event, lose sight of the work of this Convention, nor of the matter of improved roads. We proposed, however, that the Road Convention should be entirely free, and it therefore seemed best that it should be separately organized. I have been presiding for three days, and felt that some one else should have been selected in accordance with the first motion made.

The Secretary—I would state in this connection that the idea of a State Road Convention occurred to me several months ago, and was approved by the Executive Committee. Correspondence was thereupon opened with leading gentlemen throughout the State, all of whom approved of the plan. It was the intention to have a Road Convention composed of citizens from all parts of the State to consider this great subject. The State Board has discussed the question for several years, and has taken a deep interest in the matter, but we feel the need of the co-operation of other gentlemen from all over the State. We have been trying to stir up an interest in road improvement, and others have been trying to do the same thing, and we felt there should be a union of these different forces, and by this concen-

trated energy we could, perhaps, bring about a better system of road-making in New Jersey. We in New Jersey should be the leaders in this movement. You have disappointed us in the selection of your presiding officers, but we will hope for grand results from this Convention. In the course of the meeting, now or later on, a committee on existing Road laws should be appointed, and, perhaps, various other committees. I hope, before this Convention adjourns, a permanent organization will be effected, which will have in it representatives from the State Board of Agriculture and from other associations representing other interests in the State.

If allowed, I would like to call for the gentlemen named in the programme of the State Board. Although these gentlemen have been asked to address the Convention, there is no intention but that the Convention shall manage its own proceedings. Dr. Mackenzie is here and if you so desire, he will address you now.

The Chair—I take great pleasure in introducing Dr. Mackenzie, who will address the Convention.

THE VALUE OF GOOD ROADS.

BY DR. JAMES C. MACKENZIE, LAWRENCEVILLE, N. J.

There is something wrong with the farming interests of this country, and matters are not as they should be with the farmer. In spite of his hard work he is in debt.. The population of many of the rural districts is less in number and quality than it was ten years ago. The mortgaged indebtedness of American farms is increasing at the rate of \$8,500,000 every year, and the decrease in value of these mortgaged farms in a single decade (since 1880), is \$200,000,000 ! In the noble State of Ohio, the loss in value for ten years is \$7 an acre for the entire State, and this figure is not exceptional. Ex-Governor Campbell states that in ten years the total decrease in the value of Ohio farms is \$220,000,000. The country and the farmers are losing and the towns and townspeople are gaining.

And all this is true of only our own country. I find that a careful study of similar facts in twenty European countries, shows that farming there prospers in about the same proportion as other lines of industry ; and in such countries as France there is no more independent class of people. *Something is wrong with the American farmer.*

To the student of American history it is patent that originally the corporations chartered by the States were all intended to be primarily for the benefit of agriculture, as this is the foundation and support of all other industries and vocations. It is a trite thought that farming is the foundation of wealth. It is equally trite that agrarian troubles—agrarian discontent or agrarian poverty—are the most serious that can threaten a people or government. The farmer is slow to act, very conservative, inclined to endure evils and wrongs rather than resort to unusual measures to right them. But once he is aroused, he shows qualities and powers of which other classes of citizens are not possessed.

Here, then, are the facts: growing discontent, separate political organization within two years, unparalleled decrease in the value of farm lands and rural populations in all parts of our country, abnormal growth of the towns and town properties. Of course, no one cause can be assigned for this state of affairs, but it is a most striking coincidence that the discussion and legislation about country roads have been more general, more determined, during the past two years than during all of our previous history. During these two years some twenty-seven States have emphasized the need of better roads in the country, and men of all classes have become interested in the subject which calls this Convention. It is only a narrow, selfish patriotism that sees in this question a matter that concerns the farmer alone. Hence, good men, lovers of their country and of their neighbors, feel a deep interest in the construction and maintenance of better roads.

Last March the farmers of Chester county, Pennsylvania, were using a six-horse team to draw a single load of hay. On the 21st of that month one of the "leaders" in that team stumbled in the deep mud and water which covered the road and was drowned before he could get out. In Montgomery county, Maryland, during the same month, a lady recovered \$2,500 damages from the county for personal injuries received by reason of the bad roads. Costs and disbursements swelled the sum to about \$4,000.

In the single township of Hopewell, adjoining our historic State Capital, \$50,000 were spent in fifteen years in the repair of one of these dirt roads, and to-day it is as bad as ever.

The average rainfall in the United States is about forty inches a year. The dirt road must absorb this large volume of water. It then freezes, thaws, dries, pulverizes, changes from paste to powder,

and back again from powder to paste, and for weeks at a time (even when the soil is otherwise favorable) is practically impassable. Farm traffic is tied up. The roads are worse when prices are best. The farmer has produce to sell, timber to haul, purchases to make, bills to collect and to pay, grain to grind, obligations to meet; but all must wait for the road to freeze, harden or dry out.

The following dispatch to the newspapers within a month describes a state of affairs scarcely credible in this age of general light and progress: "It would take a round million dollars to even up the losses in trade to the merchants, shippers and farmers in Iowa, on account of the fearful mud blockade which exists not only in Iowa, but all over the Mississippi valley. For two weeks country roads in Iowa, Missouri and Illinois have been hub-deep in mud, and the farming communities have been virtually padlocked on the farm. As a result, merchants depending on country trade have suffered immense financial losses, especially in holiday trade, while the farmers and shippers have lost by inability to market their products. It is feared many failures among country merchants may result."

And now, before leaving these hasty descriptions of our roads, I wonder how many have had their attention called to the facts, noted by careful statisticians, that at every general election in this country a half a million of the best farmers of the land are practically disfranchised because mud-bound at home? We are told that 20,000 voters in New York are unable to get to the polls in bad weather; these voters, too, being the best political element of the country. We are all deeply interested in ballot reform, but surely the beginning of this reform should be to see that the way is open for every man to cast his vote. Ballot reform must be extended to cover the entire question. "It is just as important to get the ballots into the box as to get them fairly out of it." When you compel a farmer to travel through five or ten miles of mud to cast his vote you are taxing him heavily for his privilege, and the thing is wrong in this age of intentional fair play.

Nor is this all; the United Staates is paying \$140,000,000 a year to support our common schools. Of this sum it is estimated that \$45,000,000 a year are wasted because 30 per centum of the pupils are kept out of school, chiefly because of bad roads. It was doubtless noted in Governor Abbett's recent message that although the New Jersey schools have accommodations for 80,000 pupils beyond the

average attendance, nevertheless 137,000 children of school age do not attend school at all, public or private. If I were a member of the Legislature I should move for minute inquiry into this state of affairs. On the face of it, it indicates that nearly one-half our children are growing up in ignorance. Now, if the facts in this State are what they are throughout the country, a very large number of these 137,000 children in New Jersey are kept from school by bad roads, though other causes of detention must exist.

But some one will say to all this, good roads are undoubtedly a good thing for any community, but it is the business of each community to build its own road; it is not the business of the State, not of the county, but of the property-owners that adjoin it and use it most, to build and maintain these roads. This is the reasoning of excellent people and influential newspapers in many sections of our country. But such reasoning ignores the fact that the common highway, this very dirt road, is in the last analysis the property of the whole people. To a fair-minded man the country road that passes his door is only a part of the great thoroughfare between Maine and Georgia, between Massachusetts and California. Here as elsewhere we must learn by experience. And what does Europe teach us on this road question? Ponder the undeniable facts: *Every other civilized nation on the face of our globe has repented its shame-faced imposition upon the farmer and has made the making and keeping of the main country roads a direct charge upon the general government.* They have found it to be immensely better for the government, immeasurably better for the farmer, unquestionably better for the general wealth and property, and so the only just way. There is not to-day, so far as I can learn, a single authority or student of the road question who advocates the building and care of country roads by the farmers, except so far as their taxes would be proportionately increased. And here let me insert a long parenthesis. Many people and some farmers are frightened by this talk about increased taxes. In the State of New York a careful estimate shows that the farmers would be required to pay only about seven per centum of the entire cost of building the necessary roads and that the other ninety-three per centum would be paid by the incorporated towns and cities. Nor is this all the encouraging evidence. Even with the faulty law we have in New Jersey, I find the following facts to be true (the computations were made by Mr. Charles Smith, the Tax Collector of Lawrence township, and Dr.

James L. Patterson, Mathematical Master of the Lawrenceville School): A single Macadam road in Mercer county of say five miles, costing \$25,000, would increase the total tax of an \$8,000 farm (assessed value \$4,000) \$37.72. If this tax were extended over a period of 20 years (that is, 20-year bonds issued at 4 per centum) the increase in the annual taxes on the above \$8,000 farm would be but \$2.78. If the State and county were to pay the proportion which future laws will undoubtedly lay upon them, this tax would be very much less. *But even as it is, where is there a farmer, however embarrassed, that would not rather pay \$2.78 a year additional tax than drive through ten miles or so of mud or dust every time he goes to town?* The most unworthy alarm in road talk is that of the man or paper that screams "high taxes."

But I repeat, it is the duty of the general government, both State and National, as well as the county and township, to build these roads. That is an admirable suggestion of Dr. Ripley's, to build here in New Jersey, two State roads, one east and west from Elizabeth to Camden, and another north and south, from Sussex county to Cape May county. And so far as New Jersey is concerned she was never in a better condition to build these State and county roads. Governor Abbett's message is the best possible introduction to this Convention. I have already referred to its statements about our school attendance. The Governor congratulates the people upon the splendid financial condition of the State at the close of the fiscal year, assuring us that we were never in a better condition, and that for the first time since 1885 we have no floating debt.

Let it be remembered, too, that the cost of these roads should be proportionately paid for by the next generation as well as by this. Our children and grandchildren will enjoy the prosperity and blessings of better roads and can well afford to pay their share.

I have referred to the uniform practice of foreign countries in making the country roads a direct charge upon the government instead of upon the farmer. The example of France is most instructive; her territory is only about four times as large as that of New York, and her population is less by the square mile than that of New Jersey, so that comparison is instructive. Now, the French Republic has adopted the honest principle of doing something each year for the farmers, and she proceeds upon the theory that country roads are national property and determine the happiness and wealth of all the

people; that they are a public necessity; that like the post-office, they are national institutions, and above all, that it is monstrously unfair and short-sighted to make individual property-owners bear all the cost. Now what is the result in France of this enlightened policy? She has 130,000 miles of fine roads, and spends \$18,000,000 a year to keep these roads in repair. And all this with what further result? Read these words of testimony: "In France there is no such diversity between the material progress of the farmer and that of the merchant—between the country and the town—as is found in this country. The farmers prosper and have always prospered. Every dollar spent by the French government to bring itself more closely in touch with its rural population has been well invested. You remember that terrible war with Prussia, when the king, the warrior and the statesman led the German legions across the breadth of the French Empire, and forced the capitulation of Paris; and how the brave Frenchmen were humiliated by the exacting terms of peace which their conquerors imposed. *The immense tribute demanded by the Germans at the close of the war, now twenty years ago, was made up from moneys contributed in a wonderful degree by the French farmers;* and the admiration of the world which their patriotism excited in the payment of that tribute, was not greater than the wonder which everybody felt at the ready thrift which had enabled them to meet such enormous demands."

Some of us know the part which the Roman roads—many of which remain to-day—played in the upbuilding of the mightiest nation of the older times; and the military road of Marshal Wade through the highlands of Scotland is known to have done more for the peace and prosperity of that country than all the legislation of the English monarchs.

I have spoken of the widespread interest shown within a few years in the road question. Not only have Governors Abbott, Hill, Beaver, Bulkley and McKinley made the country road a matter for comment in their annual messages, but several of the departments of our National Government recognize the necessity for better roads, and recently the Department of State had our Consuls and Ministers in foreign countries get full information as to the building and maintenance of country roads in Europe. In view of the facts thus reported, the National Commissioner of Agriculture says in his annual report: "While our railway system has become the most perfect in the world,

the common roads of the United States have been neglected and are inferior to those of any other civilized country in the world. They are deficient in every necessary qualification that is an attribute to a good road ; in direction, in slope, in shape and service, and, most of all, in want of repair. These deficiencies have resulted not only from an ignorance of the true principles of road-making, but also from the varied systems of road-building in force in the several States of the Union, due to defective legislation. The principle upon which the several States have based much of the road legislation is known as the road-tax system of personal service and commutation, which is unsound as a principle, unjust in its operations, wasteful in its practice, and unsatisfactory in its results. It is a relic of feudalism borrowed from the 'statute of labor' of England, and its evil results are to-day apparent in the neglected and ill-conditioned roads of the country."

It is a question of vast importance to the welfare of this nation that these arteries of agricultural and commercial life should receive the attention that their importance deserves, and that an effort should be made to remedy the defects now existing and establish a system that could be made uniform and efficient in all the States of the Union.

By the improvement of these common roads every branch of our agricultural, commercial and manufacturing industries would be materially benefited. *Every article brought to market would be diminished in price ; the number of horses necessary as a motive power would be reduced, and by these and other retrenchments millions of dollars would be annually saved to the public. The expense of repairing roads and the wear and tear of vehicles and horses would be essentially diminished, and thousands of acres of land, the products of which are now wasted in feeding unnecessary animals in order to carry on this character of transportation, would be devoted to the production of food for the inhabitants of the country. In fact, the public and private advantages which would result from effecting this great object in the improvement of our highways are incalculable, not only to the agricultural community as a class, but to the whole population as a nation."*

The plain suggestion of these words from Washington is that the general and State governments should aid in building country roads, and a glance at government experience in providing better communication by water justifies the national policy. Few of us have not

taken a hand in denouncing River and Harbor bills which had for their object the cheapening of transportation. Yet, it is true, and it should be more generally known, that previous to 1860 the charge for water freight was twenty-five cents a bushel and is now only two cents—a reduction of twenty-three cents—due in large part certainly to deepening and improving water channels by government money. The total expenditure under River and Harbor bills up to January 30th, 1889, from Niagara Falls to Chicago and Duluth and on the rivers running into the lakes has been \$28,038,590. As the ascertained saving on freight charges for the tonnage passing through the "Soo" canal for the season of 1889 was \$46,466,011; the improvement at the Sault Ste. Marie returned to the country in one year, through cheaper freights, *over 165 per cent. on the total national expenditures for improving the navigation of the upper lakes*, and the estimated saving on the total lake commerce for the year was 427 per cent.

Surely, with such experience to guide us, we may safely ask not only for the proposed ship canal to connect New York and Philadelphia, but also for such an extension of paternalism in the National and State government as shall include the common country road. When we think of our wiser legislation and policy with regard to our railroads and waterways we wonder that the public roads have been left so severely in the hands and to the care of the farmer, especially when we reflect that the great volume of internal trade is by the country road. This trade exceeds by many millions of tons the entire freight business of all the railroads combined. The cost of this road freight, when compared with other freight charges, is excessive, and falls with crushing weight on the farmers in the cost and wear of horses and wagons. Never, before the present year of unparalleled abundance in farm products, was the state of the country roads more deplorable. It is little short of a national calamity that so many millions of dollars are necessarily wasted in handling countless baskets and loads of farm products over mud roads.

In the statistics of agriculture for the census of 1880 an attempt was made to find out the average cost of hauling grain from the farm to the railway station. The estimate varied from 20 cents to \$2 a bushel, and Professor Jenks, of Galesburg College, Illinois, has put the average at 60 cents. The further examination of the statistics brings out the fact that it costs the ordinary farmer more to carry a bushel of wheat a mile than it does a railroad to carry a ton. So

that, if grain must be hauled eighteen or twenty miles, the land freight eats up the profit. Good roads would reduce the cost of hauling to less than one-quarter the present cost. Moreover, with good roads, the farmer could select the days for going to market—days when he could not work to advantage at home, or when prices are highest.

It is found that a horse can draw on a common macadamized road more than twice as much, and on a good, solid Telford-Macadam road more than three times as much as he could on a gravel road. Therefore, a farmer who might send produce into market for two hundred days in the year, using a pair of horses to draw a load of about a ton, on a poor gravel road, could, if the road were well macadamized, dispense with one of the horses. Supposing that the horse cost him 40 cents a day, including interest on first cost, he would save on this single item \$80 per annum. Professor Shaler, of Harvard University, estimates that our present bad roads entail a tax of at least \$10 a year upon every family living along these roads.

Facts like the foregoing make clear the relation of this road question to national prosperity and happiness.

As a nation, and as separate States, what are we waiting for? The time has certainly come when this subtle and too long unrecognized effort which our great network of dirt roads exerts upon the social and industrial character of the people should be made a subject of popular concern. We have been long exempt from international differences and from serious home contentions; the public debt has been reduced to an insignificant figure and the general credit made secure; State obligations in the aggregate have decreased by more than \$70,000,000 within the last decade, and are now less by \$50,000,000 than the available funds and assets held in the several State treasuries.

Good roads would save many millions of dollars to the nation, and would correspondingly enrich the individual citizen. Good roads shorten distances, bring people nearer together, improve society, save time as well as money, being but parts of an interdependent system of transportation, they concern the whole people, farmer, manufacturer, consumer, producer, banker, merchant, corporations and individuals.

I have refrained from reference to the excellent roads in two counties in this State (Union and Essex), because the facts are so well known. To me a far more inspiring example of road-building is given by a former resident in Parke county, way out in Indiana. Some wicked

people deny Jerseymen the glory of our few good Jersey roads, intimating that they were built by money made and brains brightened in New York City. But here is a glowing picture from real life in the land of the Hoosier that shall form the concluding words of this imperfect paper: "The common roads were greatly improved, and to one who left the country as I did in 1867, and crossed it only by rail till 1879, the change was wonderful. Country travel had become a delight. Those who had been there all the time could not appreciate it so highly, and the 'old fogies' were still kicking against every new road. To me there was something amusing in noting many results there were which no one had anticipated. Of course the farmers hauled much bigger loads, and did it in March more easily than in August; wagons lasted a great deal longer; horses were rarely injured, and so it paid to keep better stock, and what was of very great importance, markets could be reached at any season. But the most striking results were purely social, so much so as to suggest a revised text, thus: 'Easy communications increase good manners.' Good highways are certainly the prime factor in civilization.

"The farmers, formerly isolated for weeks together, discovered that they could go where they wished with ease and at the very season when they had the most leisure. To ride a few miles after supper was an actual pleasure, and soon almost every school district had its social or religious, literary or political organization, and some had all four. [In New Jersey we should add a Society for University Extension.] There were lyceums, lectures and joint debates, recitations and amateur theatricals, something really instructive and entertaining within a few easily-covered miles of the farm for half the evenings of the winter. The Quakers of the northern township soon had a regular series of literary contests; the people of two villages got up very creditable musical societies, while the 'young folks of Raccoon Valley' capped the climax by taking the abandoned Bridgeton church, refitting it in semi-theatrical style, and giving a fairly good season of the 'legitimate drama.'

"Now it is the common thing for a popular lawyer or other professional man from the county seat to ride out ten or twelve miles after business hours, deliver a lecture to a crowded school-house and canter home by bedtime. There has been a general 'brightening up.' The winter, once so gloomy to the isolated farmer, is now the season when he really lives. Another remarkable effect was to create a sort of

furor for elegant turnouts. That county was long noted in the adjacent cities as the best market in the country for fine carriages and buggies, and at the county fair one may see hundreds of farmers' families in vehicles really elegant.

"The improvement in 'roadsters' is remarkable. Now that a trotter is no longer liable to break his leg or his neck on a country road one can afford to put some money in him. There are several notable stables in the county, and the 'Rockville track' ranks high in that racing circuit. These are a few of the many incidental advantages. No doubt some of these improvements would have come in time anyhow, but a very great deal must be credited to the fine roads."

Brethren, citizens of New Jersey, this is no fancy picture. It can be realized in any farming community, *but not, never, without good country roads*. It is a just and true observation of publicists made clear by everything we learn or know about roads, that country roads are an evidence and index of the civilization of a people. There can be no high civilization along a mud road. How fit it is that the roads of China are described as "lines of ruts across the fields, fathomless in summer, impassable in winter." It is not so strange that a large percentage of the female patients at our asylums are the wives and daughters of farmers. You freely tax the farmer for public buildings, public works, and he as freely pays his share of all State and national outlays. Why not give him some more direct returns, something he can see and enjoy and profit by, besides the distant and perhaps magnificent post-office? You owe him a free postal delivery, as President Burrough claims, and good roads. We may soon have occasion to forget that the bulk of our strong, great men were born and reared on farms, for our most promising country boys are leaving the old farms for the towns. I live among representative farmers and know that the American farmer has besides the pure air of heaven, pure water and pure milk, all needed virtues; nerve, grit, intelligence, ambition, enterprise; and to-day needs chiefly better roads to make him happy and prosperous. At present he is kept for months from that which enlightens, brightens and gladdens the home and the life in an indescribable isolation. Temperance, industry, and good roads—next to the blessed Gospel—are the needed factors of temporal and intellectual prosperity in the country, and it could be shown that good roads go far toward maintaining and encouraging both temperance and industry.

STATE ROAD CONVENTION.

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On motion, the address was referred to the Secretary.

The Chair—I am pleased to announce that the papers read here will be published in full in the "State Gazette."

The thanks of the Convention were tendered Dr. Mackenzie for his address.

The Chair—I will call for Hon. Thos. H. Dudley, of Camden. I take great pleasure in introducing Mr. Dudley.

MR. DUDLEY'S ADDRESS.

Mr. President and Gentlemen of the Convention—I apprehend we all agree on one subject, and that is the necessity of having good roads. The question is how to have good roads and pay for them, or how to have them without paying for them. It almost amounts to that.

The topic on which I am to talk to you for a few minutes is, European *vs.* American Roadways. I am limited in my remarks to the European roads as compared with American roads. I have spent much time in Europe, either in professional duties or for pleasure, and every time I have been over the European roads I have been struck with the difference between their highways and ours. This applies not only to the roads of England, France, Germany, Italy and other countries, but it applies equally to the streets of their cities in contrast with ours. The difference in the cleanliness of Liverpool or London, or Paris or Berlin streets, as compared with ours of New York or Philadelphia is very marked—and New Orleans is still worse than Philadelphia, though the Philadelphia streets are bad enough, and so are the streets of Camden.

On a certain occasion when I was entertained in Philadelphia, a gentlemen present made the remark to me—I think it was Colonel Forney—"Mr. Dudley, what do you think of the difference as to cleanliness between our streets and those of European cities?" I said, "I think we have the dirtiest and worst-paved streets in the world." The streets in European cities are kept clean, they are well paved, and there is a general appearance about the European cities, as compared with ours, which is very striking to every American—and many of you have been there and will bear me out. When you go on the rural roads in England and France, the difference is just as marked when compared with the rural roads of this country. There

is one difficulty which I will have in drawing a comparison, which is the different conditions of the countries and the habits of the people. This is particularly so in the cost of construction of the highways. The highways of England, as a rule, are faced, or built entirely with stone, broken up, say an inch or an inch and a half square, and it so happens that all over England they have these stones along their highways. Then, again, the cost of breaking the stone enters in. I have seen hundreds and thousands of people engaged in that work, and have talked to them. I think the standard price for breaking these stones is 18 pence, or about $37\frac{1}{2}$ cents per day in our money, and the laborer "finds" himself. You have no such labor in this country, even if you had the stone suitable. We have no stone in South Jersey—they must be carted long distances—although you have plenty in the upper part of the State. So from this you can see how much more cheaply a road can be built or repaired there than in South Jersey. In the southern part of England, in the counties of Kent and Sussex, they have the great chalk-butts right under the surface of the ground, and in many cases cropping out on the surface, as they do on Dover cliffs and at Folkstone. This is used—and it makes most excellent material—in connection with flint-rock, which is mixed with it, and the two combined make most excellent highways. The roads of England and France, over which I have ridden for hundreds of miles, are all kept rounded up in the center, so as to shed the water. In South Jersey, in many places where stone roads have been built, the center of the road forms a hollow lower than the sides of the roads. This is, of course, all wrong. Such roads make excellent basins for holding the water, but poor roadways, and in driving over them in wet weather, one must go splashing through the mud. The roads should be kept rounded up in the center, and ditches kept open and clear.

The Surveyors of the Highways over there are compelled, under penalty, to keep the ditches open, and are authorized by law to enter on adjoining lands, if necessary, and cut ditches to carry off the water from the roadways. When this is done, compensation is made to the owners. If the Surveyors neglect this duty, and any accident occurs through their neglect, the parish itself is liable, not the State. The roads in England are not built by the State, nor are they repaired by the State. In the majority of cases in England the State, or general government, has nothing to do with the highways. Where there is

a turnpike a toll-gate is set up, but these are fast passing out of existence. In England, though these turnpikes have been built under acts of Parliament, they are not owned by corporations, as they are here, but the parish or district generally builds them and pays for them, and in consideration of this they have the privilege of putting up toll-gates, or "toll-bars," as they call them, and of charging certain rates of toll for horses or for teams of different kinds for passing over these roads, and then the privilege of collecting this toll is set up at auction and sold to the highest bidder for one year. There they appoint persons to look after the management and repair of these turnpikes, while here this rests with the corporation building the turnpikes. My impression, during the eleven years I lived in England, was that the roads over which one passed without paying toll were kept in about as good condition as those on which toll was charged.

This may be said to be the condition of the English roads and streets, of English cities and towns. By an act of Parliament, passed in 1835, I think, the Surveyors of the Highways are directed that, in no case, shall it be of less width for teams than 20 feet. Most of them are at least 20 feet, and many of them two rods wide.

In France the roads are not as wide as ours; it is very rarely that a road is over two rods wide, and many of them are not of that width, and the roads kept in much the same condition as in England. Many of their roads are skirted with trees, as timber is very scarce in France, and the land-holders along the roads, and in some places the persons in charge of the roads, set out a peculiar kind of tree, with very thick branches or leaves, rather straggling, like the cottonwood which grows along the Mississippi. Those who have traveled in France will remember such trees.

Some of the roads in Switzerland are very good; some of them have been built by the government; there is a good road across St. Gothard, and one not yet done up to St. Bernard and others. All these roads are well built and are very good.

There is another thing to be taken into consideration in comparing European with American roads, and that is the difference in the character of travel on their roads and on ours. We Americans are an uneasy people; we are an inquiring people; a restive people, moving without ceasing—always going, always moving. We want to know everything; we want to participate in what is going on.

This is not so in England or in France; I have ridden for hundreds of miles on their roads and not met a single carriage. Around the cities you may see a few hacks going out. If you meet with anything on these country roads it is probably a dog-cart, for they don't travel as we do. At my house, where I live, just outside of Camden, the teams are passing constantly, and it has been estimated that over 300 teams pass there in one day, all heavily-loaded wagons, with truck and farm produce, mostly. Such a thing as that is unknown in Europe. Nearly all the truck that comes into Brussels, for instance, is pulled in by the wives of farmers and by dogs. Most of the markets are served with dog-carts. You will see the dog pulling the cart, and the woman in charge pushing the milk-cart. If you go to Cologne—and I would rather go to the Cologne markets than to go to the theater, just to see the row among the dogs. I have stood and laughed at them often; they are all fastened to their carts, brought there by the women, who, having unloaded the potatoes, carrots and beets they are selling, fasten the dogs to the carts. The dogs soon begin barking and howling, all trying to get at each other. It is really amusing to see them. And so it is at Frankfort-on-the-Main; the great majority of the fruits and vegetables consumed there are brought in to the market in the dog-carts in that way. Unless their roads were good this could not be done.

But we want good roads, and we can afford to have them, and no farmers in the United States can afford to have them better than we can. At the census of 1880 the agricultural lands in New Jersey were more valuable, were higher in price, than the agricultural lands of any other State in the Union. The agricultural products of New Jersey, taking the size of the State into consideration, were greater and more valuable than those of any other State in the Union. By the census of 1890 it is shown that the proud position which we as agriculturists occupied in 1880, is still maintained, and we are to-day just as rich, agriculturally, and in the value of our lands and the products raised upon them, being the first State in the Union in our productions. We are ahead of them all. It is a cause for pride and for congratulation that the people of New Jersey—the farmers of New Jersey, if you please—are not behind the farmers in any other State in this country in intelligence, in energy, in enterprise and in knowledge. If anything, they stand "number one." [Applause.]

Mr. Blish—I move a vote of thanks to Mr. Dudley for his entertaining address.

So ordered.

The Chair—I take great pleasure in introducing Mr. Robert A. Meeker, who will address the Convention.

NEED OF ENGINEERING SKILL IN PERMANENT
ROAD-BUILDING.

BY ROBERT E. MEEKER, PLAINFIELD.

One of the first questions that comes before a Road Board, Highway Commission or other body appointed by the citizens of any community to look after their interests in this particular is: Shall we or shall we not employ an engineer to assist us in our work? And more and more frequent becomes the answer, yes. Why? Because the people have learned, by costly experience, that it pays. On the score of economy, if for no other reason, a competent engineer should be secured at the very outset. Who would think of commencing a lawsuit without consulting a good lawyer? Why? Because we know that he has made a study of the law in all of its bearings and can tell us at the very outset whether we have a good case or any case at all; and what we must do and in what form we must present our case before the court. This we all recognize as the proper and only thing to do in a lawsuit; the same reasoning applies in road-building. At the outset we consult our engineer because he has made a study of road-building under all possible conditions, and hence is able to not only advise us what to do but often, what is equally important, what not to do. For example, the road may be covered with a stratum of clay or loam full of ruts, holes and hollows. The natural impulse, in fact common practice, is to take the dirt from the sides of the road and fill these. But our engineer says No, gentlemen, this is dead dirt, and if you place it on the road you will only have deeper mud the next time it rains. Plow out the sides, which are generally as high if not higher than the center, and use it to fill some deep hollow on the line of the road, or, if there be none, dump it in some hollow on one side, out of the way, and fill your center with good gravel from the hill near by, or, better still, with crushed stone. Then the question arises, what kind of stone? The engineer says trap-rock

if possible; if not, tough granite or the hardest and toughest feldspathic rocks and some of the limestones of the transition and cart; but don't use red-shale or the newer sandstones. Why? you ask. Because the experience of the old world and also of the new teaches us that it is cheaper in the end to use the hard, tough, igneous rocks than the softer aqueous rocks. The first cost of delivering the trap-rock on the road may be more, but the cost of spreading, rolling and forming the road will be the same. The trap-rock road will last for fifteen or twenty years, while the softer rocks will grind to powder and become worthless in from three to five years.

Having decided, according to your locality, what the nature of your road-covering shall be, the next question is, how shall we prepare our road to receive this covering, so as to obtain the best results? The engineer says we must run a line of levels from one end to the other of our road, noting all water-courses crossing or contiguous to the line of the road and all ditches or other means at present provided for drainage. From these levels we will prepare a profile so that at a glance we may see where the road requires cutting or filling and how much of each there is to be done; whether we will have dirt enough to make our fills or whether we will have too much; if the latter, what shall we do with it? All these things should be decided before we commence work. In other words, it is just as necessary to have a properly-prepared plan before beginning to build a permanent road as it is to have a plan and elevation of your house before commencing to build, and for the very same reasons. First, because you want to know how much it is going to cost; second, you want to know what you have to do before you begin, so that you will not have to undo and do your work over again, which is the most costly way to build anything, as you all know. A case in point occurs to me right here. Some years ago the Borough Commissioners of a certain town spent \$300 in hauling gravel onto a road and filling it in; the succeeding winter and spring they saw that they had made a big mistake, for they had backed the water further up the road and made it worse than it was before. So they went to work and paid \$300 more to haul the gravel away again, thus paying \$600 for their experience and leaving the road as they found it. They had a series of levels run, prepared profiles and gave them grades, which they have since followed, with the result that they have not had to pay for undoing work after it was done. Does the engineer's usefulness cease at

this point? Most emphatically no; no more than an architect's when the plans are prepared; he must supervise the work and see to it that the contractor or workmen employed by you by the day do what they should and do not do what they should not. He must furnish grade stakes at proper distances along the line of the road, giving the proper width and correct line of the road and the necessary amount of cut or fill; that the fill is properly made, making due allowance for shrinkage of the earth; that the sub-grade or road-bed is in fit condition to receive the coating of stone or gravel (this is one of the most important points, because it is just as necessary to have a good foundation for your road as it is to have a good foundation for your house); that the said stone or gravel is properly applied, *i. e.* leveled, formed and rolled, so as to make a smooth, hard surface, and that the cross-section of the road has the proper form and convexity, *i. e.* that it has such a cross-section as will throw off the rain-water from the center to the sides and no more. On a road too convex—high in the center—the tendency is for traffic to follow in the same track along the middle of the road (especially if the load be a large or heavy one), as that is the only portion of the road where the vehicle can run upright, the result being that hollow tracks or ruts are worn by the wheels and the horses' feet, which retain the water, thus softening the road and causing it to wear more unevenly than one of a flatter section on which the traffic is more evenly distributed over the whole width. But even more important is that the cross-section should be kept uniform and the surface even, so that no catch-waters are formed to cause hollows in the road surface; that the road-covering is composed of the proper materials, neither too brittle nor too soft, too large nor too small; in short, all those minor details that go to make or unmake a good road.

Thus far we have only considered what must be done to improve an old road. There is another equally important branch of the subject—*i. e.* the laying out of a new road. Here the services of the engineer are even more necessary, because we must first decide on our line. Shall our road be perfectly straight between the two points, without regard to hills or hollows, or shall it wind around them, so as to be nearly level? Of course we all recognize the fact that the ideal road should be perfectly level and perfectly straight, and perfectly drained by means of covered channels on each side. Except in a flat and level country, it will seldom be practicable to run a per-

fectly straight line for our road. In crossing a ridge, we look for the lowest point in proximity to our line, to avoid expensive cutting or steep or impractical grades; in traversing a valley longitudinally, we must so locate our line as to avoid crossing and recrossing streams, which would involve the expense of building bridges. Hence, a perfectly straight or perfectly level line will seldom be practicable.

To determine where our line shall run between the points of departure and destination the services of the engineer are absolutely necessary, because we want to obtain the shortest and most level line at the least expense. In other words, we want to get the best possible for the least money. The engineer runs a series of levels over what appears to be the most practical route, at the same time taking levels for some distance on each side of the proposed line, so that in case the cuts or fills are too great he may swerve his line to the right or the left, as circumstances may require, thus enabling us to determine how we may obtain the required result with the greatest economy. The location of the line having been determined, the engineer must carefully locate it, starting from some point which must be accurately located and giving the courses and distances to the other extremity, which must likewise be accurately fixed. This line must be mapped and the map filed in the County Clerk's office, so that in case of any disputes arising in the future as to the boundaries of the road or any encroachments thereon, they may be easily and positively settled. Then as to gradients; they should, if possible, never exceed 5 feet to the 100 feet, and should never be less than 6 inches to the 100 feet. The first limit should never be exceeded on a good road, for the better the road the less should be the gradient, to obtain the best results from your team in hauling a load. The latter limit should never be exceeded unless you have paved gutters; otherwise, you will not be able to properly drain your road by surface-drainage, and it will be liable to receive permanent injury from the backing up of the water and the saturating and softening of the foundation of the road. These gradients are a very important part of the work, and it requires constant attention on the part of the engineer to see that they are followed. In many cases the foreman or contractor will fail to cut deep enough or fill high enough, thinking that his eye is a better guide than the engineer's instrument, with the result that we will have hollows and holes ready to be filled with water at the first rain. In short, it is just as necessary for a grader to follow the

measurements given him as it is for the carpenter or mason those given them.

The substance of the whole matter is right here: Shall we or shall we not profit by the experience of others? Shall we or shall we not have a well-defined plan? Shall we or shall we not sit down and count the cost and look at the work to be done and the obstacles to be overcome before we begin to work?

Mr. D. C. Crane—I have been much pleased with this paper; it is in line with what I have advocated all along. A paper of this kind should be accessible to all road-makers, and it would be to the decided advantage of the New Jersey roads if this could be put in the hands of every road-maker in the State. A certain amount of money should be appropriated, and invitations given for papers similar to this, and the best published, and put in the hands of Road Overseers, and they required to know the principles of road-making before they could become eligible to the office of Road Overseer. One of the most serious drawbacks to good roads is the ignorance of Road Overseers in regard to the fundamental principles of road-making. We should establish some civil service rules in our road-making business, and this would insure us intelligent men. Your school teachers are required to be examined before they can become instructors, and enter upon their profession. Why should not the Road Overseers come under the same regulation? The competent need not fear such examinations, and it is only the incompetent Road Overseer who has poor roads. I move a vote of thanks to Mr. Meeker for his paper.

So ordered.

The Chair—It gives me much pleasure to introduce to the Convention Dr. Chauncey B. Ripley, of Westfield, who will now address you.

PERMANENT ROAD-BUILDING.

BY DR. CHAUNCEY B. RIPLEY, WESTFIELD, N. J.

New Jersey has first place in the cause of improved roads. Much meaning attaches to this declaration, for the interest in road reform has reached every State in the Union. Ours is the pioneer State. The Legislature of New Jersey was the first to pass an act for the general improvement of public roads. The Governor promptly approved the bill, and in 1888 our State entered upon a new era. Union

county, the first to avail herself of the provisions of this excellent act, has been put forward fifty years on the dial of progress and prosperity. There is a real estate boom in every city and township of the county, and land is worth, and is selling for, from ten to fifty per cent. more than it had sold for in the two previous decades. It goes without saying that the improved roads in Union county have paid for themselves already. All along the line of these county roads new and costly improvements are in progress, and in an hour's ride through the county of Union, over the Central railroad, a hundred new houses may be seen from the car windows. I stake my reputation as a prophet that Westfield, the place of my residence, will, in three years, double its population, and that the price of lands will be a hundred per cent. greater than before the passage of the Road act in 1888.

"Liberty and Prosperity" is the motto of the State of New Jersey. It is high time, fellow-citizens, that these sonorous words take on new significance; that a State lying between the two great cities of the continent, New York and Philadelphia, available in either direction for suburban residences to its very center; being the great highway by the shortest routes to the capital of the nation, to the great cities of the West and to the shores of the Pacific ocean; the road-bed of nearly every great trunk line of railway leading west from New York City; a State rich in the fertility of her soil in every quarter; grand and picturesque in her northern scenery, alike with her cottage-lined ocean shore, becoming more and more popular every year as summer resorts. It is high time, I say, that such a motto, "Liberty and Prosperity," of such a State as ours, should be amplified and verified. The closing years of the nineteenth century should develop the progress and prosperity of our State in a manner worthy the energies and experience of a hundred years. The year 1892 is a good year to bestir ourselves, and the month of January is none too early to turn on the light, subject ourselves and the century's work to a searching examination, in order that we may determine what we have to show for it all, and where we and our institutions really stand relatively to the men and institutions of the past. Wherein have we distinguished ourselves?

To be sure, Jersey Lightning, Princeton Presbyterianism and Jersey Justice are proverbial; and they have been, from a period way back, beyond which the memory of man extendeth not. No one has ever

challenged the supremacy of New Jersey in those regards. She stands to-day as she stood a century or more ago, when the foundations of Nassau Hall were laid, and the battle of Princeton was fought; the fame of her specialties is unimpaired. To-day, after the lapse of so many years, her "lightning" is still the most ardent of distilled spirits; the Presbyterianism of Princeton is the most orthodox and cerulean; and there is nothing this side of sheol so terrible to mortal man as Jersey justice.

Last year, on this platform, I had the honor of addressing the State Board of Agriculture on the subject of "Improved Roads." I then and there urged upon that body the present importance of following up the good beginning already made, by providing an improved road for every quarter of the State. First, as a general, substantial and needed improvement, than which nothing in my humble judgment could be more beneficial and satisfactory to the farmers in particular and to the taxpayers generally. I urged it, secondly, as an object lesson, likely to serve best in making the people of the whole State familiar with the construction and advantages of good roads, and so, in a short time, enlist their support in the common cause. Such a recommendation involved, of course, application to the Legislature, and also to the Executive. The Legislature of New Jersey heretofore has been in sympathy with us, and its members untrammelled by politics. We believe the same is still true, and that we may well proceed with confidence on that score. Governor Abbett appeared before the Board of Agriculture last year, and has again been present at their annual meeting this year, and suggested in his address, on both occasions, his own approval of State appropriations for the further improvement of our public roads. What more do we need? The battle is far more than half won when we have the Legislative and Executive Departments with us. We want now an organization to formulate and present a plan for accomplishing what we need and what we may have by the asking. The Board of Agriculture, though urged by me last year to act in procuring the necessary legislation, did not;* but through the sagacity and energy of their Secretary, Mr. Franklin Dye, it has brought us here to-day, and we are now organized in convention to accomplish that which might have been done long ago, and which ought now to be done; that which we are all, I believe, in earnest to

* A committee of the State Board did secure the passage of a law giving State aid for building permanent roads.—SECV.

do—give New Jersey good roads in every part of the State. In perusing an excellent publication, "Special Consular Reports: Streets and Highways in Foreign Countries," I find that only in darkest Africa, on the lonely Isle of St. Helena and a few other benighted spots on the face of the earth, is there an absence of interest in the matter of public roads. Everywhere else our American Consuls report interest in public roads; and generally an interest commensurate with the degree and age of the civilization. The leaven of New Jersey has reached nearly every State of the Union; and those who have become known as active in promoting our system and carrying it into effect practically have been flooded with applications for copies of our Road act, for reports, for circulars and other information from Maine to Texas and from Michigan to Florida. The requisition from the Department of State at Washington for the consular reports, to which I have already referred, is traceable to the improvement of roads under the New Jersey act. Many have come from other States to examine the roads of Union county, and our engineer, Mr. F. A. Dunham, has, by reason of their fame, secured contracts for building similar roads a thousand miles away.

As I said last year, I would, as a citizen of New Jersey, have a good road from Newark to Camden and another from Cape May to Sussex. As a citizen of the United States I would have a good national road from Lake Superior to the Gulf of Mexico and another from Boston to San Francisco.

Last year I promised myself and others to introduce a resolution, or in some other way to present for consideration to the State Board of Agriculture the subject of cart and wagon tire and the comparative length of fore and rear axles on vehicles of heavy draft. This year I promised to do the same thing before that body or this, and submit, with your permission, a short paper on this most important subject, urging prompt legislation in the matter.

The regulation of the width of tire and length of axles by law is no new thing. It has been done, I am informed, in many of the States of the Union. Such requirements are made by the laws of France, and from rules and practice prevailing there, where all concede are to be found the best roads in the world, I formulate the following:

1. On all freight and market carts the tire should be from four to six inches.

2. On all four-wheeled freight and other vehicles for heavy loading, the width of tire should be from four to six inches.

3. The fore axle of the latter class of vehicles should be ten or fourteen inches shorter than the rear axle, according as the tire is four to six inches wide, so that the hind wheels run in a line an inch outside of the surface rolled by the fore wheels.

The benefits from the use of wheels and axles constructed under such rules is too apparent to need much argument.

The carts and wagons become rollers. The cart with a six-inch tire rolls a foot in width whenever on the road, and when loaded is a heavy roller. The wagon rolls from sixteen inches to twenty-four inches with the tire from four to six inches.

One can hardly estimate the benefit to any fairly good road of the constant rolling which the wheels of even one wagon would do. But when the number of wagons and wheels is multiplied, and we have the wheels of an entire township, county or State as so many road-rollers, constantly rolling, packing, leveling our roads, day in and day out, ten hours a day, six days in a week, four weeks in a month, twelve months in a year, crushing and imbedding every loose foreign particle that may fall upon the surface of a road, every loose particle that may work up, it is easy to see that all our roads will become almost as smooth and free from any resistance as a billiard table.

An act, permissive but general, might be passed, constituting the Board of Chosen Freeholders of any county a Board for framing and enforcing rules and requirements for tires and axles, on such Board becoming satisfied, by petition or otherwise, that it would be in the public interest for the county to avail itself of the law. Let penalties be enforced on the score of trespass, as a means of securing compliance.

Dr. Ripley's paper was greeted with applause, and, on motion, was received and referred to the Secretary.

The Secretary—It occurs to me there should be something said at this point with reference to the evening session of the Convention. The programme indicates there may be an evening session, and possibly one to-morrow forenoon also, if we cannot get through sooner. We cannot afford to hasten this question too much, and it would be well for us to spend sufficient time on it while we are together, in order that we may have the right action when decided action is

taken. Let us take such steps as will reach the pith of the matter, if possible. We want to get through as soon as we can, but we want to reach practical results before we adjourn; we should appoint the necessary committees and take the necessary steps to form a permanent road association, if it is thought best to do so, to forward the movement in the interest of better roadways.

Mr. Dudley—With a view to bringing the matter to a head I will move that a committee of fifteen be appointed to consider the matter and report.

Mr. Tine—I would amend that motion by having the committee consist of eight members, one from each Congressional District in the State. If you have so many members on the committee you can never get them together.

So ordered, the committee of eight to be appointed by the Chair.

The Chair—We have with us Prof. L. E. Haupt, of the University of Pennsylvania, who will now address the Convention. It affords me great pleasure to introduce Mr. Haupt.

PROFESSOR HAUPT'S ADDRESS.

Mr. President and Gentlemen—I would like to say a few words to you on the subject of road-building, but will not take up much of your time in discussing the question of the economics of roads. In order to impress upon you the difference between good and bad roads it is necessary you should consider the relations of the different systems of road-building, and the uses of the different roads in daily life. They form links between the producer and the consumer, and are therefore of great importance as they are good or bad roads. But in order to make a clear comparison, it is necessary we should have some unit of comparison—some basis on which to make the comparison. We cannot compare one thing of one kind with another thing of a different kind; we cannot compare potatoes with pears, nor apples with corn, but we must have some unit or standard of comparison. We will therefore take the cost of the movement of one ton over one mile of road; as the expenses of traffic are best compared by the cost of movement, we will take the average by the various systems of roads.

The following comparison will answer our purposes very well: On an ordinary earth road, in good condition, it will cost us fifteen

cents to move one ton one mile, while over a railroad it costs five-tenths of a cent, or one-thirtieth of the cost of movement on a dirt road. By canal, the cost is but three mills, by river or lake, with deeper-draft vessels, it is only about two mills, and by ocean, only three-quarters of a mill. This will give you a very fair idea of the relative importance of the various systems of transportation, and also shows the great importance and relatively cheaper mode of water transportation, and the sooner material to be transported can reach the waterways the cheaper should be the cost of transportation. To this fact may be attributed the movement for ship canals, and for extensive water transportation, and in no place is there greater need of such a ship canal than right here across the State of New Jersey. But I do not appear before you to talk in the interest of ship canals, but have told you the relation of roads to the canal system. Taking the ratio of the roads of our country districts, the ocean transportation has the advantage of about one to two hundred, over the dirt road; over the canals, the relation is about as one to three and three-tenths; with railroads, one to six and six-tenths, and so on. It costs about thirty times as much to move a ton over our dirt roads, when in good condition, as by rail—in other words, if you live one mile from the station, it will cost you, in theory, as much to move a ton to the station as it costs to ship it thirty miles by rail, after you reach the station. This cost is exorbitant, and the question is as to the best method of reducing it. In order to reduce this cost, it is necessary, primarily, to harden the surface of the roads in some way, for this softness of the surface is one of the greatest causes of resistance, and necessarily adds to the cost of transportation. The grades also have an important bearing, and the character of the material to be used, but these are all engineering questions.

In this connection I want to say that the general tendency is to keep to the old ruts, and to run our wagons with narrow tires, which cut the roads badly, and the gentleman who has just addressed you has hit the nail on the head when he says we should have wider wagon tires, and the recommendation has been made that all wagons for heavy transportation shall have tires at least four inches wide, if made to carry two tons, and if over two tons, to have a tire with an additional one inch in width for each ton hauled. The recommendation has also been made that there be a difference in the length of axle, so that the fore and hind wheels shall not track in the same

rut. Of course, Mr. Chairman, this talk is merely educational, but we hope it will all tend to the result that some legislative action may be taken, looking to the revision of your Road laws, and we are also working in the same direction in Pennsylvania, and are looking forward to some legislative enactments which may abolish the present system with us of working out the taxes. We tried it at the last session, but the bill was vetoed by the Governor, but we hope for better results next time.

I thank you, gentlemen, for your attention.

On motion, a vote of thanks was tendered Professor Haupt.

MR. BLISH'S ADDRESS.

This road question is no small one. I am well pleased with the idea expressed by our Secretary, of extending this to an evening session, and possibly to a morning session to-morrow, as I think it should be thoroughly discussed in all its phases, even extending the discussion for the rest of the week if necessary. It is not a thing for hasty legislation, for it is of the greatest importance to us. The farmers have been talking over this matter for several years ; we want good roads, and, as has been well said, we want them without their costing us too much.

My friend could have told you still more about the good roads in Europe ; he could have told you about the thatched cottages in which the farmers themselves lived. I have traveled over those same roads, and while these cottages are nice to look at, they are not nearly as comfortable as our houses, and in many of these countries the cattle occupy a part of the house with the family. We don't want to come quite to that now. What is the result of these excellent roads they have ? Is it not one of the causes for landing on our shores from 3,000 to 10,000 immigrants per day ? Napoleon built the great road my friend speaks of, and he built it for the farmers, but the farmers were in his army. The Germans, in their last war, built many roads for the farmers, but the farmers were in their armies.

I am an advocate of good roads, but we must not go to extremes. We want good roads and permanent roads, but let us look at this thing in all its bearings. After they are constructed the item of repairs is also a serious one. I have talked to some of these gentle-

men, and they tell me it costs about \$200 a year to keep the roads in repair, per mile. I do not think we want these great highways from east to west and from north to south; the railways take the place of such highways. As has been well said, we are an uneasy people, and we wear our roads out, but is there no way we can avoid the enormous expenditures proposed?

I hope this committee will take this matter into consideration, and whatever they do, do nothing that will bring the burdens where they lie in Europe, where people get thirty-seven and one-half cents a day. Don't go to extremes in order to find the mean. Remember that in that country where they have such good roads the farmer seldom owns one foot of the ground he farms, while here the burden must come on the farmers themselves. Weigh all these questions carefully and see what can be done. If the State will give us aid, don't weight it down with Commissioners to be paid out of the county treasury, to overbalance the donation of the State. Let us see if we can't get the State to help us without too much of this dead weight attached to their gift.

I am glad this committee shall consist of one member from each Congressional District, because there is a great diversity of soils and a great diversity of needs. Many of the roads around cities should be different from those further away; as it is now, when you haul a load out of the cities in some places it is almost necessary you should unload one-third your load when you reach the city line. In New Brunswick they have built one good approach to the city, but at the rate they are going it will take about fifty years to get two or three more.

Let me say to you, farmers, go slow. Don't let us rush this matter with a boom; if we can't get through with it to-day, let us keep at it next week. It is said if you will unite on what you want the Legislature will grant it; let us be careful what we unite on, and when we are sure what we want, go ahead, but not before.

MR. GOODWIN'S ADDRESS.

We should draw some comparisons in order to make the pictures drawn by the different speakers show up better. One of the speakers before this Convention has referred to our farmers as being the most intelligent, the most progressive and the most wealthy people in the

world—and yet all this has been brought about with mud roads. In Europe the people have had good, smooth roads for centuries, and yet over these smooth roads there is little travel, except with carts, drawn by dogs harnessed with the farmers' wives. My friends, are we ready to change conditions? Let us consider what we are doing. We want better roads, but you must remember that in the United States we have the greatest number of iron roads of any country in the world, and it has been shown by some of the speakers here how much less it costs to haul over the iron roads than over the dirt roads. It has also been advocated that it is proper for the people to make and own the roads, and this ought to hold good with railroads as with macadamized roads. We don't need a road from Camden to Jersey City, for we have a railroad, but we want better roads leading to these railroads, and it would be much better to build more iron roads to take the produce to market. We don't want any macadamized roads, built at an expense of \$10,000 a mile; the roads should be built by the State, on the building-loan plan; the money should be loaned to townships on their bonds, and in about ten years and seven months, both the principal and interest will be paid back on these bonds, and the roads will be paid for. This can be done, and the people will not be bonded for the benefit of the money-lenders. Bond them to themselves; we have learned that lesson. We are masters of the situation, and this is what we should do. Let the people own all the roads, both railroads as well as other roads, and let iron roads be built.

On motion, a vote of thanks was extended Mr. Goodwin.

The Chair—We have with us Mr. Bacot, from Staten Island, and I will ask him to address the Convention.

MR. BACOT'S ADDRESS.

In Staten Island there is now a road movement similar to that in Union county, N. J., and similar to that which was formerly going on in Essex county.

I was appointed engineer of this work in July, 1890, in accordance with a bill passed by the Legislature during Governor Hill's administration providing for the construction of certain roads in certain counties of the State of New York. The law referred to Richmond and West Chester counties, but at the present time the advantages are only being made use of in Richmond county.

I have not considered the economic question of improved roads, but have thought you might be interested in hearing what we are doing in Staten Island.

This bill, passed in 1890, provides that in any county of 100,000 inhabitants the Supervisors can raise money on bonds to the extent of ten per cent. of the valuation, less the debt already on the county. This gave us \$250,000, and the amount now available is \$280,000, and we will expend about that much before the middle of next summer.

These moneys are being applied solely to rebuilding the old roads, and no new roads are being cut through. The method outlined and adopted for the Board of Supervisors, after certain surveys covering about sixty-seven miles had been made, occupying about a month, was to put about thirty miles under construction, comprising Telford and Macadam roads, and repairs to old roads which had a good foundation. Of this thirty miles under construction seventeen miles were Macadam, six Telford and seven repaired. They vary in width from fourteen to one hundred feet, the average width being about twenty feet, most of the roads being about sixteen feet. Some short lengths of road were about fourteen feet. The specifications called for eight inches in depth of stone, in two layers, and the specific requirement of the bill, which, by the way, had incorporated a set of specifications for the guidance of the engineer, not only called for stone, but stone only, and that to be of trap or granite, or equally hard stone. The binding was also to be of rock, either granite or trap.

The work has been carried on in the lines of the bill to the letter, I may say. In some cases we have used the old road materials in place of the new stone.

These roads are being built in two layers, the bottom layer varying from two and one-half to three and one-half inches, and the upper layer of four inches is of inch-and-a-half stone, placed on top to secure a good, smooth surface. Of course this is not as durable as the larger stone, but if the large stone are used on the surface the roads will wear down and leave nubs or sharp stones above the surface.

In the construction of Macadam roads there are one or two points I wish to touch on. In the first place the bottom stone should be large, though some people say there is danger of the stone working up to the surface. I have never had any difficulty in this way with four inches of small stone on top. Then, again, the bottom layer

should be rolled down solid before any of the other stone is spread on it. This is one of the secrets of getting waterproof roads, and the road should be perfectly waterproof, for if the water leaks through into the road-bed you will soon find depressions there.

Most of our roads are used for heavy traffic, and the traffic on these 30 miles of roads is something tremendous. There are four large breweries, and there are 250 brewery wagons a day passing over the roads besides many other vehicles. The consequence is that the wear on these roads is very severe, and we have been obliged to build them, in order to withstand this enormously heavy traffic, on the Telford plan. Of course you are all familiar with this plan, but there is one point about it I would like to bring to your attention. Taking a road 12 inches in depth the bottom layer of Telford is made 8 inches and the top 4 inches of small stone. In the case of Macadam the bottom layer is of 3 inches of stone. The point in regard to Telford road is this: The bottom stone should be made perfectly rigid; they should be wedged in together as in the original specifications of Thomas Telford, the inventor of this system. After the bottom is well wedged it should then be rolled. In some specifications the rolling of the Telford bottom is strictly prohibited, but I do not believe in this plan. In the case of roads where there is heavy traffic they will not wear better than the Macadam unless rigidity is secured in the bottom. Our roads are built on the heaviest clays.

In regard to the maintenance, we are establishing a system of maintenance along with the construction; every new road is in the hands of the contractor for one year, who must repair it during that time at the call of the engineer, and, if out of the contractor's hands, sufficient is held back to bear the expense.

The question of the binding material for our roads is probably affecting our roads more than anything else. The binding is that which envelops the stone, and binds it together. It is the thing which holds the road together. Macadam's theory, as many of you know, was, that the small stone could be taken and merely rolled down solid—that the angles of the stone would bind it together. Costly experiments were made in Prospect and Central Parks, but they failed signally. The best binding is gravel with a little limestone mixed in with it; the limestone in it serves to protect it and to form a sort of cement for holding it all together; we have experimented with gravel with this stone, and we find it makes a sort of

paste which hardens and makes the road solid, and if you can use the native gravel you are better off than if you use the granite dust or rock dust, for they are apt to get a little muddy on top in wet weather. Flint gravel will not answer, for there is not life or vitality enough in it—not enough adherence—but with limestone or iron gravel, or something of that nature, the binding hardens and makes a good surface. From my experience the ordinary clayey gravel would be much better than the clear rock dust, and this can readily be proven—and it has been proven to the entire satisfaction of the Staten Islanders.

Mr. Blish—What of river gravel?

Mr. Bacot—We have not used any of it, but even that, I should say, would make a better road surface than the rock dust. In the case of the Telford roads there is a great deal of controversy as to where this binding should be placed. The Telford should be built in three layers; the bottom, which is the foundation, should be built of heavy stone, then a light layer of stone, and then the binding material, and the balance clay or dirt.

Mr. Rusling—What is the cost?

Mr. Bacot—The average cost is about \$8,500; some of the roads cost over \$10,000, and some as high as \$20,000 per mile for short distances. Our Macadam roads cost about \$7,500 per mile, and in some cases exceed that, for there are a good many extras in the way of culverts and bridges. We make the bed of the roads from fourteen to sixteen feet—nothing less than fourteen feet. We have had great success with the Macadam roads. We have seven steam rollers on the island, and they are of great benefit. I am personally a warmer disciple of Telford than of Macadam, though my faith in the Macadam roads has greatly increased. We do our rolling mostly on the bottom of the road, and then on top at the finish. In building a road, at least two-thirds of the rolling should be done on the bottom stone, the stone being liberally sprinkled, as this enables the roller to crowd them closer together. The stones must have enough binding material to hold them together, and gravel is the best material you can get for this for the top.

A Member—If the Macadam is thoroughly rolled, will the wagon wheels of a heavily-loaded wagon show any track?

Mr. Bacot—No, sir; you cannot notice any track from the wagon

wheels after it is rolled. We use a ten-ton roller always, unless an unusual body of stone is used, to provide for extra heavy traffic.

A Member—Would you advocate wide tires on these roads?

Mr. Bacot—That matter was brought up in our Board and was discussed on both sides. I think there are a great many extreme views on that subject; the father of the movement even went so far as to say that tires should be twelve to thirteen inches wide. They could not turn around if they had such wide tires without going around the block. I think it will be found much cheaper to use a roller than to undertake to legislate in this direction at present.

Mr. Wood—How did you treat the foundation for the Macadam?

Mr. Bacot—It was always rolled with the steam roller, except in the case of an old road, where the roller is not imperative. It is self-evident in such event that it is not necessary.

Mr. Meech—Was this question discussed in relation to gravel roads?

Mr. Bacot—No, sir; only in regard to stone roads. The narrow tire is more likely to affect the roads while new than at any time. When the roads are thoroughly rolled, even while new, the narrow tires make but little impression on them; when the road has become thoroughly consolidated there is no rut perceptible. On all the roads finished for several months there is no rut perceptible.

A vote of thanks was given Mr. Bacot for his valuable address.

GEN. RUSLING'S ADDRESS.

I believe this is a meeting of the citizens of New Jersey. If so, and I have leave to speak, I beg to say I have listened for three hours to what has been said, and now we are about to adjourn, and I want to ask what is the meaning of this Road Convention—what is it *for* and what does it *want*? I confess I was exceedingly interested in the admirable paper of Dr. Mackenzie, which must have cost him an immense amount of work and study, though I hardly agree with all he said.

I am a sort of farmer, and was born and bred a farmer; I own farm land and pay farm taxes, and, while I am not an active farmer, I am interested in farming, and therefore do not entirely agree with all he said. For example, I have never yet seen a road-rut "four feet deep." So, he draws a doleful picture of the American farmer—

weighted with mortgages—going down to wreck and ruin; and yet, notwithstanding all this, our statistics show that our farmers have had the best year in the history of the Republic. Mr. President, we are told, on the other hand, that our country dirt roads are good enough, and a gentleman on my right, with the spirit of Patrick Henry descending upon him, eloquently exclaimed, "Give me liberty and give me mud roads." Surely you don't mean to indorse that sentiment, for you are intelligent New Jersey farmers, and know there is no natural or logical connection between them whatever. [Applause.]

Again, he told us that if we were going to have good roads, we would soon "see our wives and dogs harnessed up together and pulling dog-carts along the roads, as they do in Germany and Europe." Well, now, do you believe that? Do you take any stock in that kind of argument? Why, if they did not have good roads over there, did my eloquent friend ever stop to think the women and dogs would be even worse off than they are? What is it that creates this condition of things over there? Surely not "good roads," but kingcraft and priestcraft and ignorance and tyranny. They seize the young men in their early manhood and put them in the army, where they must spend the first and best years of their lives, instead of remaining at home and creating families and homes of their own, and therefore their women and dogs are left to do the farm-work. Were it not for their "good roads," their hard lot would be even harder and sadder. If we must choose between "mud roads" and loss of liberty, I, too, would be for "mud roads" every time. But does the gentleman mean to say that the two are necessarily joined together, and like the Siamese twins must continue together, "now and forever, one and inseparable?" Does he seriously mean to say that we must either keep to our "mud roads," or submit to despotism and tyranny, as in Europe? Is that his line of argument before an intelligent audience of American farmers? I beg pardon, but I don't believe a word of it. Why, we are a great and magnificent people; we are descended from the Pilgrim Fathers on the one side, and from the Huguenots and the best blood of Europe on the other; we are over sixty-six millions of people already—soon to be a hundred millions—made great by our own right arms, and above all (I say it reverently) by the gracious favor of Almighty God. We have become great in land, great in population, great in government, great in law, great in all the lines of life; and now why should we not achieve great things in

our public roads also? Have we done so? Or rather don't you know—don't every intelligent man here know—that the public roads of New Jersey are a disgrace and dishonor to our beloved commonwealth? [Applause.] Why, I look around me on these beautiful plains of Mercer, where my boyhood was spent and my manhood matured, and I can but say that our roads now are really worse than they were forty years ago. Mercer county has improved in every other respect, but I regret to say her public roads are simply discreditable to her civilization and culture. In the last quarter of a century we have made great improvements in our churches, in our schools, in our public and private buildings—Trenton alone growing in that period from 10,000 to 60,000, but our roads have simply stood still, if not retrograded. Where were the sons of Mercer in our late Civil War? At Williamsburg, at Fredericksburg, at Gettysburg, at Appomattox; everywhere they distinguished themselves, and covered our flag and the State with imperishable renown. But the people of Mercer have been asleep, so far as our roads are concerned. [Applause.] Why, you can't drive out of Trenton in any direction without getting into ruts of mud and sand half-hub deep nearly all the year round, and our turnpikes (so-called), as a rule, are even worse than our dirt roads at certain seasons. I say deliberately that the roads of Mercer county and of the State of New Jersey, as a rule, are a disgrace to the commonwealth, and to any truly civilized people, and it is high time we did something to reform and improve them. [Applause.]

Now, what shall we do, as a Convention? Shall we say we want good roads, but that our farmers don't want to help pay for them? That has been said here this afternoon, but I don't believe a word of it. Why, you are not paupers and beggars. You don't want good roads unless you are allowed to pay your share, and I would be ashamed of you as my fellow-citizens if you did. If we improve the public roads of New Jersey, who is to pay for them? Why, let the State pay her share, and the counties their share, and the cities their share, and the farmers, of course, their share also. Why should you not pay your just and fair share? They would be largely for your comfort, and your prosperity, and your progress—your welfare and power. And I am sure, as honest men and good citizens, you are willing to pay your fair share of the taxes to establish and maintain good roads, and make them an honor and a credit to the community. [Applause.] Our farmers, I say, are ready to do all this, and you don't want the

State to pay the whole cost for your benefit, as some have claimed here to-day. As to all that beautiful scheme of the State furnishing the money, or of our "borrowing it from the State on long time, at two per cent.," as suggested by somebody, why that seems to me all pure humbug. The State has no money. She can't create it. She can't manufacture it. She can only get it in one way, and that is by taxation, and why should we delude ourselves with words and phrases that mean only taxation in the end?

I think we now have a pretty good Road law, passed last winter (thanks chiefly to the State Board of Agriculture and its efficient Secretary), and if that law is not good enough, let's go to work and make it better. This law provides that the people of any county may have improved roads if they want them, on certain conditions. The State is to pay one-third of the total cost per mile, the county two-thirds less ten per cent., and the abutting property-owners benefited by it, not exceeding ten per cent. I think that a pretty fair law, and trust our people will think about it, and study it, and early get to work under it, as they have in Union and Essex under the Miller or Union county law. • Now, what are these improved roads going to cost? It is reported here to-day that their cost (Macadam or Telford) will run from \$5,000 to \$10,000 or more per mile; but I believe a good road is a good paying investment, no matter what it costs. Dr. Mackenzie has figured it all out (and they are good on mathematics up there at Lawrenceville), and has told you here to-day that the average cost to the farmer will not exceed \$2 apiece per year. Now would you not, every one of you, cheerfully pay "\$2 a year" for a good road in front of your farm? I think this would pay as a mere matter of economy. The Doctor told you of the old roads up there in Hopewell, where \$50,000 have been expended in the past fifteen years, and yet they haven't anything but the original dirt roads yet to show for all this expenditure! So Mr. Harrison told you how down in Monmouth they spend about \$50,000 every year in road repairs, and haven't anything but the same dirt roads they had in the beginning. Now, I put it to your common sense, is not that the experience of all our townships and counties? When you go home, take up your township accounts and see how much money has been expended—as a rule thrown away and wasted—on our old dirt roads in the past ten years, and then compute how many miles of good Macadam or Telford roads that same amount of money

would have constructed. If this had been begun ten years ago, you would now have something to show for your road-taxes. Make good roads, and pay for them in twenty-year bonds, if you want to, and the interest, taxes and all won't cost you more per year than you are now paying, and in the end you will have magnificent highways that will be an honor and credit to you and to New Jersey. I don't believe in "paternalism" in either State or National government. We are able to build our own roads, and to pay for them. But let us quit wasting our taxes and build good roads, that will last forever, and be an honor and credit to the State. For good roads, I verily believe, will do more to elevate and improve our farmers, and put them on the solid road of prosperity and progress, and keep them there, than anything else under the sun. [Applause.]

I therefore offer this resolution :

"Resolved, That it is the sense of this Road Convention that the present condition of the public roads of New Jersey is most unsatisfactory, and that it is the first duty of our people and Legislature to take the necessary steps to improve them."

I move its adoption.

Mr. McBride—I desire to thank General Rusling for giving the discussion a practical direction. Everything done before was wide of the mark, except the appointment of a committee, but the matter has not yet been taken into consideration. What are they going to do with the question unless you tell them what to do with it? There has not yet been a word said as to what you want them to do. No suggestions have been made to them, either. Is it the intention they shall have a law drafted, by which the Legislature shall build a road from Sussex to Cape May, and one from Newark to Camden, &c., costing five or six million dollars? Is the State to be bonded; is that the idea of a State road? The State cannot take hold of it for anything less than five to ten million dollars. Now, with reference to the city of Elizabeth, our friend has said, "don't boom this subject; the city of Elizabeth boomed itself and defaulted." The city of Elizabeth never lost one dollar. It lost money because it laid water-soaked wood instead of good pavements. The city of Elizabeth had a severe lesson, and yet to-day that same city has assumed one-half the \$150,000 that was expended on the roads in Union county, be-

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cause the roads have been good, and because the money has been made out of the appreciation of property in that county. That shows the difference between good and poor roads. I tell you if you are going to do it at all do it from the foundation up. Your money has been going into mud roads for years without any returns; millions of dollars have been spent without any good results. Get good roads or none at all. [Applause.] If you want the State to build the roads, say so; if you want the counties to build the roads, say so. Tell your Legislature what to do. If you have suggestions to make, now is the time to do it, and do it with a will, and as a unit.

Mr. Goodwin—I want to say this, if macadamized roads are sufficient why do they in cities lay street-car tracks and extend them into the suburbs? Why would not the iron roads be more economical and practical, because the masses of the people can use these roads at a reasonable cost? Why not extend these roads into the country and give us the benefit of them? It is much better than the macadamized road. If we have good roads let us have the best.

Mr. Harrison—I have been interested in this matter and would like to see the discussion take a practical turn, as suggested. I have constructed gravel, Macadam, and all kinds of roads, and we want to get the road the farmer uses. In Monmouth county we expend annually over \$45,000 in road repairs, and what do we get? Nothing. Nearly a half million dollars expended in ten years for nothing. How can the farmer be benefited by such expenditure? The best thing to do is to build permanent roads. The last road I built was three miles in length, and cost \$10,000 a mile. We used 10,000 tons of stone, and the railroads got \$10,000 for carrying it. The cost of the Telford or Macadam will depend on how far you must transport your material. If the material is at hand you can build for two or three thousand dollars a mile. You must improve your common roads, and my experience is that the roads should be put in charge of some one who understands how to do the work. You can make a good road out of almost anything if you keep the water off. The ditches must be right; you can make a comparatively good road of anything by proper drainage. The great trouble is that farmers won't take care of the roads, except when they have nothing else to do. Then, too, the work is not wisely superintended. The question is how we can spend this \$45,000 per annum and have something to show for the expenditure. That is the question which ought to come before that committee.

Mr. Blish—It should be considered that in every township of the State there are about two miles of roads to every square mile of area. When you come to macadamize all these roads, consider what you have before you.

General Rusling—No one pretends to say that all the roads in New Jersey should be macadamized. Only the main lines of travel are what should be done—the main lines which every farmer can reach.

Mr. Blish—You mean to make these macadamized roads for the people; the farmer don't live on these main thoroughfares. It is on the by-roads that the farmers live. I am a farmer and I want good roads, but we can have good roads without spending \$10,000 a mile for them. The gentleman spoke of what a lesson Elizabeth had learned; she is improving on it; he says she lost nothing, but her bondholders lost enough by her. I want good roads as much as any one, but I don't want bankruptcy. What is the result in Europe? I was giving the extreme on that side, as I told you, and I explained it fairly. I don't think it is prudent to spend \$10,000 or \$20,000 a mile for roads, and bond the counties or townships for it. I think those figures at \$2 a mile of increased taxes are not right. Let us be careful what we are doing, and don't let us fall into error in our hurry. Let us go straight to work and know what we are doing before we give out the contract.

Mr. McBride—The gentleman has said there is one mile of road for each two square miles of territory; I think that is hardly correct, though it may hold good in some townships.

Mr. Blish—Nothing can be made to lie like figures.

A Member—I hope the gentlemen will not prolong the discussion on these lines, for in the next paper to come many of the points brought up have been answered, and ably answered, and I hope this discussion will not prevent this paper being read before we adjourn.

A Member—All will agree that the resolution adopted is correct. What I am anxious for is to see some proposition presented for discussion and for adoption by this Convention which will secure the desired results. These general propositions do not amount to anything. You say our roads are poor, and we need better roads; we all know that, but what we want to know is how to secure better roads. I would ask the General to allow his resolution to remain until the evening session. We want to know what legislation is necessary to secure the results he speaks of.

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General Rusling—I see nothing to be gained by postponing the resolution. If it amounts to nothing it will do no harm to pass it; if the gentleman has a better one we will consider it, and if in the line of progress I will cheerfully vote for it; I never have my eyes in the back of my head, and I am willing to see anything in the line of progress. The resolution, it seems to me, is a very proper one, and I doubt exceedingly if this Convention is ready to take up any specific thing, but we want an expression to give out, embodying the general sense of this Convention. Now what says the resolution? “It is the sense of this Convention that the present condition of the public roads is most unsatisfactory, and it is the first duty of our people and Legislature to take the necessary steps to improve them.” Now what are the necessary steps? I will answer the gentleman. I don’t know; it is not my business to know, for I am not an engineer; I am not a legislator, and I can’t act. I doubt if this Convention can say exactly what it wants. But there sits the Legislature, and here are our County Boards watching and waiting to see what we do; and our demand is, in the words of our resolution, “It is the sense of this Convention that the present condition of our public roads is most unsatisfactory, and it is the first duty of our people and Legislature to improve them.” I think that’s about right, and let the Legislature be free to take such steps as may be necessary in their judgment, for the best interests of the State and of the whole State.

The question then being on the adoption of the resolution as offered by Gen. Rusling, it was unanimously adopted.

Mr. Parry—I would offer the following resolution:

“WHEREAS, The present system of making roads is unsatisfactory and insufficient—

“*Resolved*, That we direct our committee to appeal to the Legislature to make an annual appropriation of \$150,000, with the provision it shall be expended in different counties of the State wherein an equal amount shall be raised, for the permanent improvement of the roads.”

I want to get this on a business footing, and therefore move that resolution.

A Member—That is taking logical action; bills should be prepared and sent to the Legislature, for that is entirely right and proper. It seems to me, however, we are not ready to suggest a certain sum of

money, and this is therefore crude in this sense. I therefore hope it will be voted down, for the present at least.

The Secretary—I agree with the remarks of the gentleman who has just spoken, for I do not think we can come to a head in so short a time. When the other papers are read, thoughts may be brought out which will be of value in considering this question; new ideas may be advanced, and after a while we may get the general sentiment crystallized. Let us fight it out on this line, then, if it takes all day to-morrow; let us be honest in this work, and take time and do it right.

Mr. Hill—This motion, as I understand it, looks to a change in our present laws, and I think before the motion is put we should hear something of the incongruities of our present laws from our friend Judge Lanning, and I would like to see the motion withdrawn for the present.

The Secretary—Judge Lanning is here, and we will hear from him this evening. There has been a bill already passed by both houses of the Legislature, in line with the proposed legislation alluded to in the resolution offered. The Governor was willing last year to give us \$20,000, and he has now gone a step forward and is willing to a State appropriation of \$75,000 a year, instead of \$20,000 as last year. One hundred thousand dollars has been asked for by the Executive Committee of the State Board [see page 15, report], the amount thus expended coming from the taxes on railroads, which are increasing every year. Why not ask for \$100,000 to be used as provided for in the bill of last winter, or something similar, for the building of these roads? We heard something said about a thousand years being required to build these roads on such a basis. God built the earth, but not in a minute. We must make a start, and the first county to take advantage of the law named will be the first to derive benefits from it. Make a start, and start something permanent and helpful. One wants to know what is the meaning of this Road Convention, and another thinks all that has been done hitherto is wide of the mark. Why, Mr. President, there is a logical connection in the papers read or to be read here. After they are presented the subject will be well before us, and we will be better able, as it seems to me, to act intelligently and wisely. [Applause.]

Mr. Blish—I move that the resolution be laid on the table, for the present, until we hear these other papers read.

So ordered.

On motion, a recess was taken until 7:30 P. M.

STATE ROAD CONVENTION.

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EVENING SESSION.

January 21st, 1892.

President Burrough in the chair.

The Chair—I wish to state that I am personally thankful to Mr. Bacot for his address before the Convention, for he has given us many good points on road-building. I think we will achieve some satisfactory results before we get through with the evening session—something we can hand over to the committee and on which they can act. We will now call on Mr. Owen, who will address you. It gives me much pleasure to introduce Mr. Owen, of Newark, N. J.

THE CONSTRUCTION AND REPAIR OF COUNTRY ROADS.

BY JAMES OWEN, NEWARK, N. J.

- I would preface my remarks with the statement that this is not a treatise on city pavements nor a paper on boulevards, or the best way to build good roads for trotting, but a few ideas as to what, in the writer's opinion, should be the best way of building plain country roads, or, more properly, highways, with the least amount of money consistent with the best general results. The three influences that govern the construction of roads are—first, how to get your money; second, how best to lay out your road, and, third, the proper way to build it.

The money question I do not propose to inject at this time, being a matter, as a rule, beyond the inquirer's province, and generally beyond his capability of handling.

The second point, that of location of roads, is hardly a matter of consideration at this time, as the object of this meeting and the tendency of this paper is for the improvement of existing roads, and I would only allude to it in one view of the case, and that is, as the existing roads have almost been uniformly laid out with the views of local wishes and desires, and not with the idea of the best location of the roads themselves, their improvement will be a matter of much graver consideration, involving more care, and probably more expenditure of money, than if due appreciation in their early location had been given to the question of grade and the character of soil along their route. However, be this as it may, the problem before us is

how best to improve them as they are, and that reduces us to the one main point of consideration, the betterment of their condition.

Before going into the question of material for construction, it would be well to consider two or three points inherent to good work, and applicable to all road-construction. These are, viz., the determination of grade, drainage and the finished shape of the road, and it may be safely said that no good and successful road work can be accomplished without a proper consideration of these three important items.

As to grade, it may be asserted that no road should ever be built on a level grade ; and in my experience no grade should ever be less than six inches in one hundred feet, as much more as you can possibly get, up to twelve inches in one hundred feet, which is probably the most suitable grade for highways, and gives a free and proper flow of the surface-water from and off the road itself. Wherever water stands in a roadway of any kind (except, of course, city pavement), it has a tendency to disintegrate the material of which it is made, making it soft and easily influenced by the travel upon it. The result is either ruts or holes, both an abomination to travelers ; but the ruts are worse. The hole is probably occasional, but the rut stays along with you, and whenever a rut is started each ensuing traveler makes it his business to run in it, enlarge and keep it up, as a friend not to be parted with. By a proper grade, then, to your road, you eliminate one source of trouble, namely, standing water. The extreme steepness of roads is, of course, dependent upon its location. A grade of four feet in one hundred is the limit of good, easy traveling, and anything steeper than ten feet in one hundred should not be allowed, and that grade should only be permitted in exceptional circumstances. The custom of having grades of thirteen to fifteen feet in one hundred in mountain roads is a bad one, and is due to the haste the originators had to get there, wherever it was, and a few extra miles in the length of many mountain roads would have saved many thousands of dollars in horseflesh, and obviated many impressive remarks by the travelers struggling up and stumbling down ; and it would be in order here to suggest that in the proposed improvement in the roads of the State this one point be taken into consideration, and the very bad grades be eliminated even at a present extra outlay of money. But in all establishments of grade make the standard limits between one and four feet in one hundred, and you will always have satisfactory results.

Incident to the grade of the road is the shape of its finished surface, known generally under the name of its crowning or rounding. Good judgment and experience are more required on this one point than in any other question of road-building. If the road is too flat the water will not run off properly, and ruts are formed. If there is too much crowning the travel all concentrates in the center, and ruts are occasioned in that way. If these ruts are on a steep grade the water follows them instead of running to the sides of the road and tears out the material. Another point should be remembered, that a road should be constructed with an inch to a half inch more crown than is permanently designed for it, as the bulk of all travel is in the center, and this would settle the center more quickly than the sides. The writer's experience is that a crown of 12 inches in a 30-foot road, settling to 10 inches soon after completion, is about the desideratum. An extra allowance of two inches should, however, be given to grades steeper than 5 feet in 100 to shed water more quickly, and on all steep grades breaks or thank-you-marms should be put in about 400 feet apart, to make the shed doubly sure.

On the matter of proper drainage I would lay especial stress. Of course, I do not suggest in the construction of these proposed State roads that an elaborate system of underdrainage should be undertaken, but I do insist that under certain circumstances and certain conditions, money spent in properly removing accumulating waters is money saved.

In ninety-nine cases out of a hundred it is cheaper to dig or ditch, to drain a hole, or pocket or swamp, than it is to fill the place up, yet to my knowledge money, time and energy have been wasted in filling with stones and bowlders wet and low places in roads, with still unsatisfactory results, when if one-tenth of time and energy had been consumed in draining these same places, permanent success might have been insured. In one particular case I remember, on a road that had been traveled for over one hundred years, and during that period stones and bowlders had been dumped to keep teams and loads from getting mired, on my proposition of lowering the grade of the road and removing these stones, I was solemnly assured of the folly of such a proceeding and undoing a century's work. The result, however, proved the contrary, as a good road has existed ever since the new grade was made.

What I would suggest, however, in the general drainage is that

with proper grades care should be taken to shed the water thoroughly at the low points, and if the grades are long, also at proper intermediate points. Where quicksand is struck, or soft, boggy ground, special provision must be made to avoid permanent and unceasing repairs. Quicksands can always be permanently treated by proper drainage, but bogs and swamps of large area cannot usually be so handled. The use of brush and similar material is best to make usually a permanent road.

Incidental to the crowning and grades is the proper surfacing of earth for the reception of the road material. Under all circumstances and at all times should the surface of the ground be similar to the finished surface of the roadway, with proper shoulders to hold the material in shape. No dumping the broken stone haphazardly on the existing uneven surface and then spreading it to make the top uniform. This never will, never has made a good roadway, and it is an essential element for successful results in road-making to dig out to the depth necessary, to trim off with a proper crown, and then put on your stone.

The next problem for consideration is the material to be used for the finished surface, and without taking into consideration the various materials used and suggested for roads, there is only one fit to be used for good permanent results, and that is trap-rock. There is plenty of it in New Jersey, and the only problem is to get it to the place where it is wanted.

I had at first thought that in discussing a question of this magnitude and importance that it might be deemed wiser to carefully consider the different materials that might be suggested and even might be used, that are to be found in this State, but the practice is so crystallized and with the uniform acceptance of the materials by all and every one connected with road-building it would be against my better judgment to suggest any other material than that of trap-rock.

This summary conclusion only applies to the finished surface. What is proper to be used for foundation or whether foundation is to be used at all is a matter open to discussion, as the practice is varied even in this State as well as in others. My own opinion is only of value for what it is worth. My own practice is almost uniformly to use a foundation for the support of the broken stones. Occasionally under pressure of circumstances I have built thin roads, but not of my own free will. Except on steep grades, in fact, of later years I

have been varying the thickness of roads according to the grades, making them 10 inches thick for grades flatter than 1 foot in 100; 8 inches for grades between 1 and 4 in 100, and 6 inches for grades steeper than 4 feet in 100. This practice I have found gives uniformly good results. I am satisfied, however, that it is feasible in a country with gravelly soil to lay thin pavements and have them last well, but in no other localities except on steep grades do I think it wise to have no foundation.

The material for foundations may be of any durable stone; even water-worn sandstone is not objectionable, but if round they should be broken into parts, as such round stones are apt to work to the surface. In my early construction of roads I was very strenuous about having trap-rock foundations, and even now mostly use that material for that purpose, as it is as handy as any other in the region in which I am constructing roads, but in sections of the State remote from trap-rock quarries I do not think it economy to haul the foundation-stone so far.

Under all circumstances the foundation-stone should be laid by hand, close together, firmly wedged, with smaller stone on top, and this whole mass thoroughly sledged to a uniform surface.

And just at this point I want to lay special stress on the importance of sledging, wedging any foundation that is put in, for in my observation, in the ordinary practice of repairing country roads, it has been customary to use a great deal of field-stone to help out these soft places, and with proper handling of the material used in such places, a fairly successful road might have been made. The result, however, was, after the layer of earth that had been put on had been washed or worn off, the road was very uneven and very much rutted, and somewhat of a torture to travel on. The cause of this was due to the fact that whereas, in wedging and sledging the foundation, you are enabled to distribute the load of a heavy wagon traveling over it, under the old way the concentrated weight came on individual stones, which sank and yielded an insecure or yielding bottom.

The thickness of foundation should not be less than five inches and as thick as the run of the material will permit. I built a mile of road with the foundation-stone taken out of an old stone fence. It was found cheaper to put them on the road as they were than to break them, and the result was the foundation averaged about ten inches thick. I must strongly allude, however, to the danger of using

perishable stone in the foundation. Better have none at all than material liable to decay.

Having laid and constructed a good foundation for the road, it is then ready for the top-course, which should be, except on very special occasions, of trap-rock. Before putting in the broken stone it is better to spread a thin layer of loam or clay, just sufficient to fill the spaces of the stone and make an even surface. Care should be taken not to have too much, as it does no good and harms the road. This packing, as it is called, is put there to prevent the bottom stones from coming up and mixing with the top-course, which they are almost sure to do without its interposition. The usual size for the broken stone is from one and a half to two inches in diameter, for on this part of the work depends the future smoothness of the road, and only men specially adapted to this kind of work should be allowed to do it. In my experience few men have or get the proper knack of spreading.

After the stone has been put on to the proper thickness and evenly spread, it should then be rolled, and here comes in again another point of discussion. Years ago it was considered imperative in the construction of a good road to have a steam roller. Experience, however, showed that a road could be constructed as well without it, and the trouble caused by the breaking of culverts, scaring horses and deterring travel generally within a mile of a steam roller led, first, to its condemnation by the community, and finally to its abandonment. No steam roller is used to my knowledge on any of the roads in Essex county, and I am glad of it.

A roller weighing about two tons, easily moved by two horses, is all that is necessary, costing say \$150 to \$175, which should be purchased and owned by any community who are road-building.

The rolling of the top stone should be sufficient to bring the stones down to a fairly uniform surface; another thin coating of loam is put on, and this is then repeatedly rolled, and the usual practice is on top of this to put on a coat of broken stone screenings, which is then rolled, and then travel is allowed to come on.

I wish to say at this point, that while the top coating of screenings is very desirable, where great economy is desirable I think it can be dispensed with, for if it is possible to repair roads by covering them with a coating of three inches, and then rolling it properly and covering it with loam, I see no reason why new roads cannot be finished off in the same way. It requires a little more care, and you have to

have a certain amount of travel to make it a success. I repaired the main avenues of Essex county in that way for years, and their condition was an indorsement of the method.

To do it properly, however, after the top stone is rolled and the coating of loam is also rolled, let the travel come right on. This makes ruts and furrows which a repeated rolling will remove, and let this be kept up till the surface is consolidated. The roller need not be kept in one spot all the time; let it go ahead and roll a new piece; come and smooth off an old piece, and so backwards and forwards, still, however, progressing regularly forward.

When you have arrived at this period of your road's construction the general idea is that that is all, but I wish to say here very emphatically, not yet. A new road, like a new watch, wants watching and adjusting to get it into a new, permanent shape, and for the first year it wants to be looked after with some care. Ruts are apt to be formed, holes may appear, and these should be at once attended to. It is very easy, costs very little, but when this is done you will have what we all want and what this meeting purposes—a good road.

After the settling and adjusting have taken place and everything is satisfactory, a road built as here outlined will last from three to five years for ordinary country travel. I have known a pavement always in good condition to run ten years without repairs, and in my own case parts of the old Pompton turnpike, with fairly heavy country travel, had no repairs on them for five years, and were good at all times.

Now I come to another feature of the road question, which to my mind is more important than all others, and that is their repair.

While the road taxes in this State show that the repair of ordinary earth roads is an accepted fact, and money is voted therefor all over the State, when a pavement is laid down there seems to be a sort of recognized feeling that when it is built that is the end of it. Far from it.

Shoes wear out, wagons wear out, almost everything wears out by constant use, and so do roads, so that any organization formed for the construction of roads in any community should be continued for their repair. In repairing roads I want to depart from the usual, accepted doctrine, and say don't patch. The old practice and theory of keeping men on the roads perpetually tinkering and mending is wrong in principle and expensive in practice.

If a road is built properly it should wear uniformly, and when its thickness is so reduced that it is necessary to re-cover it with broken stone, let it be done in sections as large as you please, from a mile to half a mile, and it should be laid, spread and rolled in the same manner as described for the building. Of course it may, and undoubtedly will, be necessary to touch up stray places that under peculiar conditions are defective. These should be attended to, but as a general practice, I say again, don't patch.

The remarks I made about screenings, in construction, are still more applicable to repairs. If you can afford it, put them on; they make a nice road, but are expensive, as a coating of loam costs from \$30 to \$50 a mile and a coating of screenings from \$300 to \$400.

The foregoing remarks apply, as will be seen, only to what is known as Telford and Macadam roads, and if all the sections of the State will have these kinds of roads, and are willing to pay for them, so much the better, but the question will arise whether it may not be wiser in certain localities to use the materials nature furnishes to hand and try to get along with them. To me it is rather a delicate matter, as, wedded as I am to this class of roads, I may be prejudiced against other kinds; yet I am willing to admit that the gravel found near Pompton, or slate in Sussex county, makes good roads, yet they are not as good, and for a small portion of the year, especially in early spring, are far from perfect, and the difficulty arises that in a question of State policy all sections should be treated alike, and my special plea will be that these Macadam roads as described are standard types and everybody should have them if they can get them.

We now come to the important question of cost. Roads built in the manner I have described cost, in Essex county, 60 to 80 cents a lineal foot, 16 feet wide, according to their thickness and distance the material has to be hauled, including foundations of quarry-stones. This would be \$3,000 to \$4,000 per mile. By using local stone for foundation and local help in hauling, and as much as possible local labor, and also reducing on many of the local roads to 14 feet, and even 12 feet, I think the cost throughout the State might be placed at \$2,500 per mile, provided due economy and wise administration are secured.

In the cost of repairs, a proper recoating of the surface can be put on in the same locality for from 20 to 25 cents per lineal foot, for a 16-foot road. This, by reducing the width and supposing a renewal every five years, would amount to about \$150 per mile on the average.

On the basis of \$2,500 per mile for construction, and \$150 per mile per annum for repairs, let us see where the problem would land us.

By the report of the different municipalities and townships submitted to the Governor for the year 1888, we find 169 townships reporting an expenditure of \$537,000 for the construction and repair of public roads. As there are about 247 townships in the State, and basing the calculation on the same rates, it would give an expenditure of \$785,000. As, however, these returns include the counties of Hudson, Essex, Bergen, Passaic and Union, who have and are now completing a system of roads of their own at a large expense, it would be proper to deduct these counties from the above statement. Deducting therefrom the reported expenditures of 35 townships in those counties, amounting to \$238,368, we have the reported expenditures of 134 townships, amounting to \$299,000 for the rest of the State. As there are about 202 townships outside the five counties mentioned, this would give us an expenditure of \$450,000 in one year for the repair and maintenance of their roads, which in ten years would amount to the sum of \$4,500,000, enough to pave and macadamize, on the basis of \$2,500 per mile, 1,800 miles of roads, and repair \$3,000 miles of pavement for ten years. In making a superficial estimate of the miles of roads of the State, I find they run about fifty miles to a township, so with 202 townships there will be about 10,000 miles of road to improve outside the five counties.

The most astonishing part of the matter, to my mind, is that this vast sum of \$450,000 per annum is practically thrown away. Roads that have been in existence 50 or even 100 years have had enough money spent on them to put them and keep them as first-class macadamized roads, yet practically they are in the same condition now as then.

With these few remarks, I apprehend my province ceases. How much money is to be raised, how it is to be raised, and how, when and where it is to be spent, is financial—out of the province of an engineer. So I will not meddle with it, but I may be pardoned if I give a short description of what I may call the ideal system of building county roads in country districts.

Having got your money in hand, with a prospect of a continuous supply of such a needful commodity, just let the community decide through their local officers or through town meetings, as they wish, what roads they will improve.

Then let some competent man, an expert road-builder of necessity—I don't say engineer, but preferably an engineer—decide on the general character of the improvement, grades, lines and drainage. This man might be a State officer or a county officer having a certain district of large area to attend to, either a county or even two counties.

Then let a local Superintendent of Roads be appointed for the township, who shall be of good intelligence and apt to learn, who is to be thoroughly posted in the proper construction of roads, and competent to handle the details with economy. This, except the broken stone, is all the outside element I would inject into each system.

By far the larger proportion of the cost of these improvements is for labor of horses and men. All farming communities have these to hand, and at certain times easy to be obtained, and the labor available will be of unusual intelligence and able to do more work and better than such as is acquired in thickly-populated communities.

At the proper and cheapest time, which is generally winter, let the teams haul stone for foundations, and let it be spread along the line of improvement. If any breaking is necessary, let it be done at the same time. Of course, if no foundation-stone is available, it will have to be bought in the same way as the broken stone.

Let the teams hired from the farmers plow out the road-bed and let all suitable stone in the old road-bed be used in the new. A gang of four men hired continuously to do the laying, sledging and spreading will then be all the permanent force necessary.

The most costly item will be undoubtedly the broken stone, and this in most cases will have to be bought by the ton or cubic yard, delivered at the stations on the different lines of railroads, then hauled to the site of the improvement, and this hauling will be the item that will vary the cost of roads in different localities.

Trap-rock quarries are being now opened all through the central part of the State and stone-breakers erected, so that the railroad transportation is a small item comparatively, and the heaviest cost will be in those districts building roads far from railroad facilities, except where water, river, canal navigation are available. And then the Hudson river trap enters into the market and competes with the other sources.

When the trap-rock is indigenous it may be found cheaper to break the stone by hand in the immediate locality, thus saving the haul from and to the cracker. All the penal institutions of the State can

use their convict labor advantageously for breaking stone, as is now done by hand at the Essex County Penitentiary and by machinery at the Hudson county.

In purchasing stone the custom now is only to get and use it in summer-time, many stone-breakers shutting down during the winter. I think money could be saved by buying and hauling the stone in winter, when teams have little to do. This saving would more than offset the extra handling in the end.

I am laying, perhaps, more than usual stress upon points and methods of economy in the work, but, with my knowledge and experience in road-building, I have seen so many incipient systems of road-improvement in many enterprising communities receive a complete setback on account of wastefulness and carelessness in their work that I am particularly solicitous that any general attempt at improving the roads of the State at large should have the advantage of the experience of other communities and avoid the pitfalls that they have fallen into.

The magnitude of any proposed State system will be somewhat beyond the ordinary experience on this continent, and if such a system is adopted it will take years to perfect and watchfulness to keep it perfect. Yet, with a full knowledge of what it wants, how to do it and a willingness to pay for it, there is no reason why New Jersey could not be the peer of any country on the globe in the matter of good country roads.

On motion, a vote of thanks was extended Mr. Owen.

The Chair—It affords me great pleasure to introduce Judge Lanning, who will now talk to you on our existing Road laws.

JUDGE LANNING'S ADDRESS.

Mr. President and Gentlemen—I regret to say it has been impossible for me to prepare a paper upon the subject assigned me, but I can give a brief outline of the subject in a very few minutes, showing what is the legislative policy with regard to the maintenance of roads in this State. I will give you what the old policy has been and what it is now.

The first general Road law, I believe, was passed by the Colonial Legislature of New Jersey in 1716, which provided for the appointment of two Road Overseers for each township in the State. The

appointment was made by the Justices of the Peace of the respective counties. This was a substantial re-enactment of the English method of maintaining roads, the law there providing for the appointment of two Overseers for each parish in each of the counties of England. This English policy, which was transported to the Colony of New Jersey in 1716, is the foundation of the legislation of New Jersey in regard to the maintenance of roads, and may be termed the township system.

In 1798 many of the laws of the State of New Jersey, including the Road laws, were revised, and the system of township supervision retained. But the act then provided that in each township, at the annual town meetings, there should be as many Overseers elected as the voters at the town meeting might deem necessary, and these men so elected were all regarded as township officers. If the township elected five Overseers the duties of these men were assigned them by the Township Committee. The township was divided by the Township Committee into road districts, geographically, and each man was assigned to his respective district. This plan was continued, in the main, throughout the State, until, I think, about 1850. From 1850 to 1875, when our Constitution was amended, there were a host of acts passed by the Legislature, special in their nature, applying to particular townships and containing provisions not at all in harmony with one another. Under some of these acts the roads were maintained by school districts; under others by the Township Committees instead of Overseers; and under still others the township was divided into permanent districts, and the voters of each district authorized to select their own Overseer. In many other townships, also, a practice sprang up of electing special Overseers for special districts at annual town meetings, even where no special or general law authorized such elections. I remember very well, when I was a boy, living on the farm, that our township, though small, had fifteen road districts; and the first ballot I ever cast was for fifteen names for fifteen District Overseers, with forty or fifty miles of roads. After the amendment to the Constitution in 1875 the Legislature passed a number of acts with respect to the election of Road Overseers, providing that Township Committees might, where they had not already done so, divide the townships into road districts, and thereafter elect by road districts, and, in other cases, making other provisions that would provide for a system of township government of roads.

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The objection to this township or district system, it seems to me, is that it does not provide a plan for maintaining roads at all adequate to their permanent improvement. The roads most needing permanent improvement by the Telford or other equally good process, are not the byways, or those least frequently traveled, but the roads having the heaviest travel upon them. You cannot have by the system of township or district government a power that will enable you to obtain permanently-improved roads from one town to another. Take Mercer county, for instance. If you want to build a road from Trenton to Lawrenceville, two townships are crossed; if to Pennington there are two townships to be crossed. In 1869, I think it was, the Essex Board was created by act of the Legislature, whose system of road government is a county system. Another act provides that in certain counties there shall be Road Commissioners. Some three or four years ago I had the honor of reading before the State Board of Agriculture a paper on the care of roads, in which I made the suggestion that I thought it would be well to do away with the election of Road Overseers by road districts, and put the control of township roads in the hands of Township Committees, giving them the authority to employ men to make the necessary repairs. The idea was adopted by the Legislature a year ago, not exactly as suggested, but, in the main, the same. The roads are thus put exclusively in the hands of the Township Committees, and they are authorized to employ men to make the proper repairs. You will note that from 1850, when the Legislature began to pass that host of special acts to which I have referred, the policy on the part of the Legislature was to take from the townships the supervision of roads, and vest that authority in road districts, but this is legislating in the wrong direction for the securing of good roads. A year ago, as we have seen, the Legislature adopted a policy that was exactly in the opposite direction. They did away with the supervision of roads by Overseers of Road Districts, and placed the control in the hands of the Township Committees, thus restoring the township system established in 1716 and continued until about 1850. Another act was passed a year ago, which has been referred to here this afternoon, and this act provides for the building of roads by State aid. See how far in the opposite direction the Legislature has gone. The act provides for roads permanently constructed, under the joint supervision of the Boards of Chosen Freeholders of the county and the Commissioner of Agriculture. The

law is inoperative, because the bill introduced to provide for the Commissioner of Agriculture did not go through. I understand that this oversight will be remedied at the present session of the Legislature, and I believe the Governor has expressed himself in favor of such remedial legislation. The act provided for an appropriation by the State of \$20,000 annually. When a road is constructed under it, one-third of the cost is to be paid by the State, and two-thirds by the county in which it is. A proviso is made that the annual expense to the State shall not exceed \$20,000. I now understand the Governor is strongly in favor of increasing this appropriation. You will observe that what I am trying to impress upon you is that the tendency of legislation is now in the opposite direction from what has been the rule for the last forty years. In my judgment, the present policy is the right one. The act further provides that whenever the owners of two-thirds of the lands abutting on a certain road shall present a petition to the Board of Freeholders of their county, saying they are willing to pay ten per cent. of the cost of a permanently-improved road, then it shall be the duty of the Board of Freeholders to proceed to award contracts and build the road. That puts the building of the roads where, it seems to me, it should be—in the hands of the people who live along the line of the road. I think it would not be wise, at this time, to ask of the Legislature anything that may impede the movement now being made, because it is now in the right direction. We need county aid in order to get roads from town to town. We want State aid too.

I have nothing further to say, having pointed out the difference existing between the past and present methods of maintaining roads. We must work to secure the passage of the bill now before the Legislature for the amendment of last winter's act, in order that that act may become operative, for it is a step in the right direction, and will aid in giving New Jersey good roads.

I thank you for your attention. [Applause.]

A vote of thanks was unanimously tendered Judge Lanning for his instructive remarks.

The Chair—If it is the pleasure of the Convention the Chair will announce the Committee on Roads by Congressional Districts :

1st District—Hon. Thomas H. Dudley, Camden.

2d District—Clayton Conrow, Cinnaminson.

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- 3d District—E. G. Harrison, Monmouth.
- 4th District—Hon. Benj. F. Tine, Hunterdon.
- 5th District—Abram S. Duryea, Hudson.
- 6th District—P. T. Quinn, Newark.
- 7th District—E. J. Johnson, Jersey City.
- 8th District—C. T. McBride, Elizabeth.

The Chair—Mr. James Neilson, of New Brunswick, is here and will say something on the road question. I take pleasure in introducing the gentleman to the Convention.

ADDRESS BY JAMES NEILSON.

Avoid, as far as possible, the creation of public indebtedness, as its tendency, once created, is to grow, and the fraud and extravagance which experience has shown to be almost inseparable from a system of public roads carried on by the issue of bonds, are worse than the bad roads. Moreover, they are apt to grow so fast as to put a stop to the construction and hinder the repairs of any that may have been built. There is no such thing as making posterity pay for present work.

It is difficult if not impossible to make a just distribution of thoroughly good stone roads entirely by tax, whether it be city, township, county or State taxation.

In the city of Utica, N. Y., a system of paving and repaving is working well, under which the city pays one-third and the property immediately benefited two-thirds the cost. In New Brunswick, sixteen to twenty-foot wide Macadam has been laid, the property-owners and those particularly interested in using a street paying one-half, and the other half being paid for by general tax. The city in each case is to keep the roadway in repair.

In Passaic county, I am informed, the new Macadam roads are kept in repair at the cost of the county, by contracts running five years, at about \$150 a year, per mile.

Good Macadam roads twelve to sixteen feet wide and five inches thick, when consolidated, should be made at from \$3,000 to \$6,000 per mile. A stone surface eight feet wide and five inches thick will answer an excellent purpose on perhaps most country roads. If a road in a clay soil be well drained to keep the water from running on

or under it and be covered with five inches of broken stone put on in two layers, the top consisting of stone evenly broken of the size of chestnut coal, the interstices on top filled with stone the size of pea coal, and the whole well rolled, so as to be at once thoroughly solid, using perhaps a very little clay, which will eventually work off, to hasten consolidation, this tight stone coating will act as a roof, the clay soil will never become wet and will not heave or give way, but will carry the heaviest traffic as well as if one or even two feet of stone were used. These are the principles laid down by John Loudon Macadam, the father of English road-making, in a report to a committee of the House of Commons in 1811, as the result of twenty-six years of observations of the greater number of the roads of England and Scotland, and again to the President and Board of Agriculture in 1820. He condemns the use of a layer of large stone underneath, on account of its tendency to more rapidly wear the top coating. This is the method now meeting with great success in Passaic county. Sharp gravel of even size, free from sand when obtainable, will on the same principle make a good road surface.

It is most important that it shall be understood that a thin coating of even and finely-broken stone or clean, sharp gravel, which is the same thing, will make a good road when properly applied and drained, as the main cost of most road-making consists in the obtaining and drawing this material, and the less of it that will answer its purpose the less money will be needed.

Could the Road act under which so much good work has been done in Union and Passaic counties, be confined to spending of money raised each year by taxation, it might answer for the rest of the State, but as it allows of a considerable issue of bonds, with the danger that the limit may sometime be removed, there is danger of extravagance, if of nothing worse.

The change in the Road laws which replaces the old Overseer of Roads by the Township Committee, and compels money payment of road taxes, has made a wonderful change for the better during the last year, so far as my observation extends.

As educated skill and cheap materials are the two prime requisites for a good system of roads, in connection with a just and feasible method of paying for them, I have to suggest the appointment of a competent State Road Engineer, to be assisted by as many young men as might, in time, be found wise. Both the chief and his assistants

should be, in fact must be, civil engineers, and capable men, to be paid by the State, who should advise and furnish plans for the construction of roads throughout the State free of charge. I would also have the planning and supervision of bridge construction in their charge, in the same way as the care of bridges and roads is under one department in France. At first I would have nothing compulsory about their employment.

Then I would have the State purchase, from time to time, as it might seem advisable, quarries, and erect and operate steam stone-breakers with the usual rotary sieves. This might be done in connection with counties, townships or cities; this system might extend to gravel pits in some instances. From these I would suggest the furnishing at actual labor cost, or perhaps free, of road materials for use on the public roads.

The whole to be under the general management of a State Department, to consist, say, of the Governor, the State Geologist, the Chief Road Engineer, perhaps the President or Secretary of the State Board of Agriculture and an engineer who has shown ability in the charge of some city or county roads, with a secretary to do the clerical work.

Mr. G. Carlton Brown—As we really have no existence as an organized body, I move the following resolution:

“Resolved, That a permanent organization be now effected, to be known as ‘The State Road Improvement Association,’ the officers to consist of President, Vice President, Secretary and Treasurer, Executive Committee, consisting of one member from each Congressional District, an Advisory Board, consisting of one member from each county.”

I move the adoption of the resolution.

Mr. Cutler—I do not like to see that done. We have too many permanent boards and too many commissions fastened upon us now. I am unwilling that the arm of the State Board of Agriculture shall be weakened by the creation of any new board. The State Board of Agriculture has done a good work in this State, and any change for the better in the minds of the public in regard to permanent road improvement in the State has been created by the efforts of the State Board of Agriculture. I was anxious, therefore, that this meeting should be presided over by the State Board of Agriculture, in order that we might have the prestige of that Board in our efforts to secure these improved roads.

The Chair—It strikes me I can see some utility in the resolution of the gentleman, for, while we are separate, we are one, so to speak. We have a committee of one from each Congressional District to take action on this subject, and, owing to the lateness of the day, if that committee wishes to do anything it must come together at once, or be too late for the present Legislature.

Mr. Cutler offered the following:

“Resolved, That a committee of three be appointed by the Chairman at his convenience, who shall during the coming summer examine into the laws, systems and practical road-making of the adjacent States, and for that purpose may visit such States; and prior to the first day of October next shall submit to the Executive Committee the result of such labors, and shall prepare and formulate a general Road law for the State of New Jersey, to be submitted to the next Legislature for enactment; and that the Executive Committee shall cause such general law to be printed and circulated throughout the State prior to the 15th day of October next, in order that the voters of the State may be enabled to know and judge of the proposed legislation prior to the election.”

The Chair—In reference to the appointment of another committee, we already have a committee of eight, and we do not want to go to the expense of another committee if this one will answer the purpose.

After some discussion the resolution was adopted.

Dr. Ward—I would like to see this Convention indorse the action of the Legislature last winter in passing the new Road laws, and would make the following motion:

“Resolved, That this meeting indorse the action of the Legislature of last winter in passing the two Road laws—Chapters 84 and 201—and that we protest against their repeal.”

Unanimously adopted.

Mr. Hill—I am thoroughly in sympathy with the resolution, and would it not be wise to go one step further and ask the Legislature to amend the law so as to make it operative, as suggested by Judge Lanning?

Mr. Neilson—I understand that includes the law which was inoperative because no Commissioner was provided for. There is one clause in that law which I question, and that is that the property-owners making a request of the Freeholders of the county for a road, the Freeholders must grant that road. These property-owners

are only to pay ten per cent. of the cost, and the county two-thirds, and the State one-third, and the liability of the State can only be \$20,000, while the county liability may be much greater. It seems to me this is giving the land-owners along the road a good deal of power to compel the Freeholders to carry out their wishes, and the first lot of owners who jump in can compel the Freeholders to build their road. This seems hardly fair and hardly as it should be.

The Chair—We do not want to take any backward steps, but we should indorse the Legislature for the steps they have already taken. This new township law places the power with the property-owners, the taxpayers, and not with the Road Overseers as formerly. What power had you over the roads before? None at all. It is a step in the right direction, and we should indorse the action of the Legislature in what they have so far done.

Mr. G. C. Brown—I would again offer my resolution in regard to a permanent organization. I cannot agree with the gentleman who says the whole matter should rest with the State Board of Agriculture. There are a great many others equally interested with the farmers in this matter. We would like to be in this with them; we would like an organization such as there is in New York State, and which has done glorious work. We understood this matter was to be started by the State Board, but that an organization would be formed with the object of improving the roads of the State, and that others than farmers could become members of this organization. I think this should be done, for a great deal of good can be accomplished by this means.

The Chair—I heartily concur in the resolution offered, and hope it may prevail. In regard to the State Board of Agriculture assuming this, I would state they already have a sufficient amount of work on their hands, and it seems to me it would be better to have a permanent organization.

Dr. Ripley—We were invited here by the officers of the State Board of Agriculture to meet in convention, and we came here and have been allowed to sit during the deliberations of the State Board, and now you say you don't want us. We came here for the purpose of this organization, and we were very glad to come to the State Board meeting, but we are here from all over the State and we should not be satisfied now if the State Board should say they have no fur-

ther use for us. We are now doing just what we came here to do, and as it is late let us do it at once.

Mr. Burrough—So far as the resolution itself is concerned, I can see nothing detrimental in its passage. If I understand it aright, it is proposed to form a permanent organization—call it what you like. This, as I understand it, is formed entirely outside of the State Board of Agriculture, though I can promise you that the State Board will extend you a very cordial welcome and a helping hand in the work of securing improved roadways. [Applause.] We are willing to do almost anything in reason to further these objects, and I see no objection to the formation of such an organization as is in contemplation.

The question being on the adoption of the resolution, it was agreed to.

The following nominations were then made, and unanimously elected :

President Hon. EDW. BURROUGH.....Merchantville.
Vice PresidentC. B. RIPLEY, LL.D.....Westfield.
Secretary and Treasurer....FRANKLIN DYE.....Trenton.

Mr. Brown—As Dr. Ripley has been chosen Vice President he cannot well serve on the committee of eight.

On motion, it was decided that the vacancy be filled by the Executive Committee.

On motion, the officers chosen, President, Vice President and Secretary, with the committee of eight, shall be the Executive Committee.

On motion, the roll of counties was called to secure nominations for the members of the permanent organization of one from each county.

Atlantic	(None present.)
Bergen.....	(None present.)
Burlington	Henry I. Budd.
Camden.....	Elwood Evans.
Cape May.....	(None present.)
Cumberland	M. R. Bacon.
Essex	James Owen.
Gloucester.....	D. S. Adams.
Hudson	A. W. Duryea.
Hunterdon	H. F. Bodine.
Mercer	Wm. M. Lanning.
Middlesex.....	J. H. Denise.
Morris	G. W. Howell.
Passaic.....	J. S. Wise.

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Salem.....	Richman Coles.
Somerset	Calvin Carl.
Sussex.....	A. J. McBride.
Union.....	C. T. McBride.
Warren.....	N. Warn.

Mr. McBride—If any of these gentlemen decline to serve I move that the Chair fill vacancies.

So ordered.

Mr. Brown—I move the Executive Committee be instructed to draft a constitution and by-laws for a permanent organization.

So ordered.

The Chair—I will announce the name of Mr. C. T. McBride, of Union county, to fill the vacancy caused by the election of Dr. Ripley. Allow me again to extend you my thanks for the amount of work done and the progress made by both the State Board and the Road Convention. I feel if you look back over the road we have traveled, you will agree with me that we have not met here in vain. The session has been very fruitful for both bodies. It took us a long while to get this far, but we have not been, and are not discouraged.

Mr. Brown—I would like to extend to this new association the best wishes of the strongest organization in existence for the promotion of good roads—the League of American Wheelmen, with a membership of over 25,000, and expecting 40,000 within the next year. Our object is the improvement of the roads in the United States. We have started a paper called “Good Roads,” and have put large sums of money in this, and any help we may receive will be gratefully appreciated.

On motion, the Road Convention adjourned *sine die*.

FRANKLIN DYE,

Secretary.

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