STATE OF NEW JERSEY.

TWENTY-FIFTH ANNUAL REPORT

OF THE

State Board of Agriculture

1897.

Printed by Order of the Legislature.

TRENTON, N. J.:
THE JOHN L. MURPHY PUBLISHING CO., PRINTERS.
1898.

To the Hon. John W. Griggs, Governor of New Jersey:

SIR—In accordance with the act creating the State Board of Agriculture, adopted April 22d, 1884, and with the provisions of the law approved June 15th, 1895, I have the honor to present the report of said Board for the year 1897.

FRANKLIN DYE,
Secretary.

Dated TRENTON, Mercer County, N. J., Nov. 29th, 1897.

STATE BOARD OF AGRICULTURE.

OFFICERS FOR 1893.

PRESIDENT.

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

VICE PRESIDENT.

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

TREASURER.

WILLIAM R. LIPPINCOTT.....Fellowship.

SECRETARY.

FRANKLIN DYE.....Trenton.

EXECUTIVE COMMITTEE.

H. F. BODINE.....Locktown.
JOS. B. WARD.....Lyons Farms.
WALTER HERITAGE.....Mickleton.

ALSO,

THE PRESIDENT, VICE PRESIDENT, SECRETARY AND TREASURER.

THE TWENTY-FIFTH ANNUAL MEETING

OF THE

New Jersey State Board of Agriculture,

HELD IN THE

STATE HOUSE, TRENTON, N. J.,

Wednesday, Thursday and Friday,

JANUARY 12th, 13th and 14th, 1898.

BOARD OF DIRECTORS

New Jersey State Board of Agriculture.

1898.

Term of office for all except the two-year County Board Directors, from January 1st 1898, to December 31st, 1898.

Class A.

EMMOR ROBERTS	Geological Survey.
SAMUEL R. DEMAREST, JR.	Board of Visitors, Agricultural College.
SAMUEL B. KETCHAM	Board of Visitors, Agricultural College.
E. B. VOORHEES	Director of Experiment Station, Professor of Agriculture.

Class B.

JOHN T. COX	Master State Grange, P. of H.
M. D. DICKINSON	Secretary State Grange, P. of H.

Class C.

HORACE ROBERTS	State Horticultural Society, two years.
CHARLES BLACK	State Horticultural Society, one year.
JOSEPH EVANS	American Cranberry Growers' Association.
J. J. WHITE	American Cranberry Growers' Association.
EDMUND BRADDOCK	Burlington Pomona Grange.
GEORGE E. DE CAMP	Central District Pomona Grange
GEORGE C. TONKINS	Gloucester County Pomona Grange.
E. M. HEATH	Hunterdon County Pomona Grange.
W. A HARRIS	Salem County Pomona Grange.
NICODEMUS WARNE	Warren County Pomona Grange.

Board of Directors.

NAME.	ADDRESS.	TERM.	COUNTY.
L. H. PARKHURST	Hammonton	2 years	Atlantic.
V. P. HOFMANN	Egg Harbor City	1 year	
ABRAM C. HOLDRUM	Westwood	2 years	Bergen.
MALCOLM H. ANGELL	Etna	1 year	
THOMAS J. BEANS	Moorestown	2 years	Burlington.
GEORGE L. GILLINGHAM	Moorestown	1 year	
A. J. DRIVER	Kirkwood	2 years	Camden.
SAMUEL BATTON	Blackwood	1 year	
FRANK HARRIS	Rio Grande	2 years	Cape May.
FREDERICK SMITH	Woodbine	1 year	
H. O. NEWCOMB	Cedarville	2 years	Cumberland.
——— ———	Shiloh	1 year	
J. H. M. COOK	Caldwell	2 years	Essex.
WILBUR W. DE CAMP	Roseland	1 year	
GEORGE H HORNER	Mullica Hill	2 years	Gloucester.
WALTER HERITAGE	Mullica Hill	1 year	
I. H. HOFFMAN	Baptisttown	2 years	Hunterdon.
JAMES LANE	Readington	1 year	
JOHN D. RUE	Trenton	2 years	Mercer.
A. D. ANDERSON	Trenton	1 year	
D. C. LEWIS	Cranbury	2 years	Middlesex.
RUNYON FIELD	Bound Brook	1 year	
GEORGE L. DU BOIS	Tennent	2 years	Monmouth.
JOHN H DENISE	Freehold	1 year	
OSCAR LINDSLEY	Morristown	2 years	Morris.
L F. FISH	———	1 year	
H. R. WILLS	Toms River	2 years	Ocean.
C. M. ROBER	Toms River	1 year	
RICHMAN COLES	Woodstown	2 years	Salem.
HOWARD G. COOPER	Pedricktown	1 year	
ERNEST C. TAGGART	Griggstown	2 years	Somerset.
AMOS C SUTPHEN	Somerville	1 year	
WILLIAM H. LEPORT	Deckertown	2 years	Sussex.
GEORGE VANDRUFF	Deckertown	1 year	
E. P. BEBEE	Elizabeth	2 years	Union.
OGDEN WOODRUFF	Elizabeth	1 year	
WILLIAM C. ADDIS	Delaware	2 years	Warren.
BYRON R. CLIFFORD	Delaware	1 year	
W. HOAGLAND	Princeton.	Princeton Agricultural Society.	

We find all the organizations represented and only two absentees.

M. D. DICKINSON,
GEORGE VANDRUFF,
D. C. LEWIS,
Committee.

MINUTES OF THE TWENTY-FIFTH ANNUAL MEETING.

FIRST DAY.

MORNING SESSION.

WEDNESDAY, January 12th, 1898.

The Twenty-fifth Annual Session of the New Jersey State Board of Agriculture was called to order by the President, Hon. D. D. Denise, at 10:30 A. M. The meeting was opened with prayer by Rev. Dr. Maddock, of Trenton. Roll of delegates was called, showing a very full attendance.

The Chair—I welcome you, gentlemen, to the Twenty-fifth Annual Session of the New Jersey State Board of Agriculture, and in doing so wish to impress upon you that the success of the meetings depends upon you doing your part to make them interesting and instructive, as well as upon the speakers we have engaged to talk to you. The Executive Committee have prepared a programme for your deliberations; the Secretary has some announcements to make in connection with it, and we will call upon him to do so.

The Secretary—One of the speakers, Mr. Brigham, Assistant Secretary of Agriculture, has just telegraphed me of his inability to be present. Professor Voorhees will speak to-morrow, in place of Colonel Brigham, instead of Friday, and, in place of Professor Voorhees, on Friday Professor Fairchild will talk to you about "Thrift on the Farm." With these exceptions, I believe all our speakers will attend, and the programme can be carried through as printed.

The programme was adopted as printed, with changes noted.

Minutes of the last meeting were adopted without reading and as printed in the Annual Report of the Board.

The Chair then announced the following committees:

On Resolutions—E. M. Heath, Hunterdon county; Walter Heritage, Gloucester county; S. B. Ketcham, Mercer county.

On Credentials—M. D. Dickinson, Salem county; George Vandruff, Sussex county; D. C. Lewis, Middlesex county.

On Officers' Reports—G. L. Gillingham, Burlington county; J. D. Rue, Mercer county; Richman Coles, Salem county.

On Legislation—Job S. Haines, Gloucester county; Hon. Abram C. Holdrum, Bergen county; William B. Lippincott, Burlington county.

Report of the Executive Committee was then presented by the Secretary. (See report.) Report was received and referred to Committee on Officers' Reports.

Mr. Lippincott then presented the report of the Committee on Legislation, which is as follows:

Mr. President and Members of the State Board—The committee appointed at the last session of this body to look after matters of legislation met as occasion required during the session of the Legislature, and endeavored to note all matters referred to them as well as other legislation in the interest of farmers.

Resolution No. 1, in regard to the disbursement of school funds, referred to the committee by this board was fully covered by Senate Bill No. 69, which was passed in the Senate but was lost in the House.

Resolution No. 2, from the Somerset County Board, relative to trespassing with horses and hounds under the name of fox-chase, &c., became a law.

Resolution No. 3, by the State Board, recommended a bill providing for the destruction and prevention of injurious insects in this State. The bill was introduced and passed the House without any opposition, but failed to become a law.

Resolutions Nos. 4 and 7 proved unnecessary, from the fact that no change in the method of taxing bank stock was recommended by the State Board of Taxation.

Resolution No. 5, in regard to the boards of chosen freeholders being superseded by commissioners, was embodied in Senate Bill No. 41, but did not pass, owing to the opposition mainly from counties containing large cities.

Assembly Bill No. 146, in regard to the State acquiring the ownership of the turnpike roads, became a law.

Experience proves that it is difficult to have game laws passed by the Legislature unless in the interest of sportsmen. Two bills were introduced at the last session, one to issue permits and the other to allow owners of land or their tenants to kill any game animals which destroy farm crops. Neither of these bills passed.

The bill to increase the appropriation to the Tuberculosis Commission, introduced by Senator Parry, did not pass.

We cannot close this report without referring to the death of our friend, Hon. Isaac W. Nicholson, who was appointed Chairman of the Legislative Committee of this body. He held numerous offices of trust and discharged the important duties assigned him faithfully, and his reputation and influence extend beyond the boundaries of this State. We loved him for his kindly spirit, his manly virtues and noble character.

ABRAM C. HOLDRUM,
WM. R. LIPPINCOTT,
Legislative Committee.

The report was adopted and ordered published in the minutes.

Report of the State Grange was read by Mr. Cox. (See report.) The report was adopted and ordered to be printed in the minutes.

At the close of discussion following State Grange report, a committee consisting of Emmor Roberts, J. T. Cox, Jos. Fitzga, Oscar Lindsley and H. O. Newcomb was appointed to draft a resolution expressive of desired changes in existing game laws.

Then adjourned till 2.30 P. M.

FIRST DAY.

AFTERNOON SESSION.

Mr. Denise called the meeting to order at 2:30 P. M., and Mr. Hoagland, from the Princeton Agricultural Society, was received as a delegate, after which a committee of one from each county to serve on a nominating committee to nominate officers of the Board for the ensuing year was named as follows :

Atlantic	H. L. Parkhurst.
Bergen	S. R. Demarest.
Burlington	Edmund Braddock.
Camden	A. J. Driver.
Cape May	Frederick Smith.
Cumberland	H. O. Newcomb.
Essex	W. W. Decamp.
Gloucester	Walter Heritage.
Hunterdon	James Lane.
Mercer	S. B. Ketcham.
Middlesex	D. C. Lewis.
Monmouth	J. H Denise.
Morris	Oscar Lindsley.
Ocean	C. M. Rorer.
Salem	Howard Cooper.
Somerset	E. C Taggart.
Sussex	W. H. Leport.
Union	Ogden Woodruff.
Warren	W. C. Addis.

Mr. Roberts—The committee appointed at the morning session, to formulate a resolution in regard to the game laws, beg leave to report the following:

Resolved, That it is the sense of the New Jersey State Board of Agriculture that the rights of owners of the soil are paramount to the rights of sportsmen on said soil, and the horticulturists, fruit-growers and farmers should at all times and seasons have the right to kill and destroy such animals as are destructive to their plants, trees or other crops.

The report of the committee was received, and the resolution referred to the Committee on Legislation.

The Secretary then presented his annual report. (See report.)

The report was received and referred to the Committee on Officers' Reports.

Professor Voorhees was invited to the chair, and the President then delivered his address. (See President's address.)

The address was received and referred to the Committee on Officers' Reports.

Mr. J. E. Rice, of Yorktown, N. Y., was then introduced, and spoke on the subject of "Poultry and Egg Production." (See address.)

A vote of thanks was given Mr. Rice for his very interesting and valuable address.

Then adjourned to 7:15 P. M.

FIRST DAY.

EVENING SESSION.

The meeting was called to order by Mr. Denise, at 7:15 P. M., introducing Dr. Byron D. Halsted, Botanist and Horticulturist, State Agricultural College, who delivered an illustrated lecture on "Leaf Green in Its Role in Crop Growing." (See lecture.)

Prof. John B. Smith, Entomologist, State Agricultural College, was next introduced by the Chair, and delivered an illustrated lecture on "The Entomological Work of the Experiment Station of the Past Year." (See address.)

A vote of thanks was then extended to Drs. Halsted and Smith for their valuable addresses.

The meeting then adjourned until 9:30 A. M. Thursday.

SECOND DAY.

MORNING SESSION.

The morning session was called to order by President Denise, at 9:30 o'clock, introducing Rev. Maurice Penfield Fikes, pastor of the First Baptist Church, Trenton, who opened the session with prayer.

A number of resolutions were handed in and referred to the Committee on Resolutions for report. (See resolutions.)

The report of the Tuberculosis Commission was then read by the Secretary, and ordered to be printed in the annual report of the Board. (See report.)

Hon. W. D. Hoard, ex-Governor of Wisconsin, was then introduced by President Denise. Mr. Hoard addressed the Board on "Modern Demands in Successful Dairying." (See address.)

Governor Hoard was followed by Dr. Henry M. Mitchell, Secretary of the State Board of Health, who gave some suggestions with reference to further needed legislation for better dairy inspection. (See remarks.)

Both speakers were accorded a vote of thanks.

Board then adjourned to 2:30 P. M.

SECOND DAY.

AFTERNOON SESSION.

The meeting was called to order by President Denise, at 2:30 P. M. The following resolution was introduced by Mr. Horace Roberts:

WHEREAS, The laws in different States require the inspection of nursery stock, certifying that the same is free from San José scale and other injurious insects and diseases, before shipping into said States; *and whereas*, there is no official in New Jersey whose duties require him to issue such certificate; therefore,

Resolved, That this matter be referred to our delegates to the State Board of Agriculture, who shall confer and co-operate with the Legislative Committee of said Board of Agriculture, in order that some action may be had to relieve the nursery interest in this State.

Mr. Roberts—This resolution was passed by the New Jersey Horticultural Society, and is deemed of considerable importance to the horticulturists of the State. I would therefore move its adoption without reference.

Prof. Voorhees—I second that motion for two reasons. First, out of courtesy to those in a position to know better than we what is needed, and second, because it is an important matter. Immediate action should be taken, for, as the matter now stands, the horticulturists are laboring under difficulties. Certain surrounding States have passed similar laws, and our nurserymen should be put on the same basis with those of such States. I therefore hope that the resolution will be adopted at once.

Mr. Black—It is an important matter for all of us, and for the public generally. Every honest nurseryman wants to send out stock that will give satisfaction. We have been depending upon the generosity of the State Experiment Station for this inspection, but they have no authority for doing the work, and there is no compensation for it. As they cannot continue the work, it leaves the nurserymen in bad shape.

Mr. De Cou—Is this practicable? The other States have a law that all stock shall be inspected. Is it at all practicable to inspect all this nursery stock? Is it possible, even? This stock is going and

coming all the time, and where there are shipments, as there are, of thousands of currants and goosberries, blackberries and so on, going and coming all the time, I cannot see how such inspection could be made.

Mr. Black—In other States the proper official places an inspection certificate on the outside of the box.

The Chair—It would be a hardship to our nurserymen if they were tied to our own State for the sale of their stock.

Mr. Black—Some people defer planting trees until they are sure they can get them free from disease. With such an inspection we will have some protection in our own State, and it will also be a protection to our customers in other States.

The Chair—It would seem as if there should be some such inspection. I, for one, would not want trees sent to me without it.

Mr. De Cou—I don't want to antagonize the matter, but it seems to me entirely impracticable to make such inspections.

The Chair—Because we cannot kill all the diseases it is hardly wise for us to fold our arms and refuse to do anything.

Mr. Black—I think my friend De Cou looks at it in the wrong light. People will not buy stock from those having no certificates. The nurseryman doesn't feel so much in favor of this thing, except that he needs it in order to sell his stock, and if he has it he is all right. It is to the interest of the public to know where they can get good trees, and no one can sell stock without having such certificate.

Mr. Roberts—New Jersey has no law to prevent the introduction of stock not inspected, and any stock can be shipped here whether infected or not. We simply ask that we be put on the same footing as nurserymen in other States.

Professor Voorhees—This resolution goes no further than that. The inspection as to freedom from scale is another thing. This does not come into the discussion at all. We believe we will be benefited in our own State by such an inspection.

The resolution was then adopted and referred to the Legislative Committee.

Prof. E. B. Voorhees was then introduced and spoke on the subject, "Fertility of the Land." (See address.)

The Chair—It was recommended yesterday that resolutions be drafted bearing on the death of the late I. W. Nicholson. The Chair

will appoint as a committee to draft these W. R. Lippincott, J. M. Lippincott and Elwood Evans.

The Secretary—I would announce that we have stored in the State House numbers of the annual reports of this Board for the last ten years. If any of our farmers wish copies of these reports and will send me their name and address, I will have copies sent them. Of last year's reports we have but few left, most of them having been distributed.

Prof. Julius Nelson, Biologist, State Agricultural College, was then introduced and spoke on the subject, "Abortion in Cattle." (See address.)

Mr. Gillingham—I offer the following and ask that it be acted on without reference to the Committee on Resolutions:

WHEREAS, There is a strong probability of a bill being framed at the present meeting of the Legislature to provide for the inspection of dairy cattle from which milk is sold in the cities of this State; therefore,

Resolved, That our Executive Committee be directed to co-operate with the Dairy Commissioner and State Board of Health in framing such a bill as will be satisfactory to the dairymen.

I move its adoption without reference.

Mr. Lindsley—In seconding this motion I would add that it would seem as if some action of this kind should be taken at this time. The papers are reporting cases of typhoid, typhus and other fevers which are claimed to have been traced to the use of milk, and, as it is certain that some action will be taken in the near future looking to an inspection by the State of these dairy herds, it is preferable that the farmers themselves should step in and endeavor to secure the passage of a law which may not be so hostile to their interests, securing the right by the State authorities to a proper inspection of the healthfulness and cleanliness of the animals supplying milk to the citizens of the State. There is no more important question you can have before you than that of furnishing clean and healthy milk to the citizens of the State.

Mr. Gillingham—If a bill is prepared we should have a hand in its formation. We do not want an inspector appointed who has not the agricultural interests at heart. I hope the resolution will be adopted.

Mr. Decamp—Is there not a law which already covers this matter? Such inspections are made in some localities.

Mr. Dye—Those are by local boards of health.

The Chair—This is a State, and not a local matter.

The resolution was then adopted and referred to the Executive Committee.

Mr. Heath—Your Committee on Resolutions report the following:

Resolved, That the New Jersey State Board of Agriculture is in favor of the present system of taxing bank stock in the municipality where the stock is held.

This is reported favorably, and we recommend it be adopted and referred to the Legislative Committee for their action.

The report of the committee was concurred in.

Believing that the farmers of the country should receive a just share with others of the benefits afforded by the government which they are taxed to support, and especially the privilege of a free delivery of mail matter now enjoyed by the cities; therefore,

Resolved, That the New Jersey State Board of Agriculture respectfully request our Senators and Congressmen from this State to aid in the establishment of such a system of mail delivery for country residents of New Jersey, and that a duly-attested copy of this resolution be forwarded to our Senators and Congressmen.

We report this resolution favorably.

The resolution was adopted and referred to the Executive Committee for their action.

WHEREAS, It is important to increase the interest of County Boards of Agriculture in organizing and reporting their actions and other reports to the State Board; therefore, be it

Resolved, That the County Boards be permitted to make such laws and regulations as they may deem best to promote their efficiency.

We recommend that this resolution be referred to the Executive Committee of this State Board.

The report of the committee was concurred in.

Resolved, That it is the sense of this State Board of Agriculture that the "Act to prevent adulteration and to regulate the sale of milk," passed March 14th, 1882, shall be so amended as to prevent

dealers, large or small, from using chemicals, or coloring matter, to adulterate or preserve their milk, as it is not only unhealthy but presents unjust competition with those who furnish milk fresh from the dairies.

This is reported favorably, and we recommend its reference to the Legislative Committee of this Board.

Mr. Crane—I know of several cases where people have been brought before the court for this adulteration, and the juries have decided that a few drops of acid or some chemical did not necessarily hurt the milk, and was not an actual adulteration. We all know it is worse than pure water, and yet that is forbidden, and rightly so; but this adulteration by means of chemicals is permitted, or is not stopped, by the courts, and it is therefore an injury to the farmers of this State. I therefore move that the report of the committee be concurred in and that every effort be made to have this considered an adulteration.

The report of the committee was concurred in.

Resolved, That the New Jersey State Board of Agriculture is in favor of the repeal of chapter 144 of the laws of 1896, in reference to the carrying of freight by trolley or traction roads.

This is reported favorably and referred to the Legislative Committee for their action.

The report of the committee was concurred in.

WHEREAS, The right of the people to be exempt from the operation of laws creating bonded debts without their consent is guaranteed to them by our Constitution; therefore, be it

Resolved, That the Committee on Legislation are hereby authorized to insist that any law creating an issue of public bonds be first submitted to the people who are to be affected by said bonds, for their rejection or adoption.

Reported favorably.

The report of the committee was concurred in and the resolution was referred to the Legislative Committee of the State Board.

The committee, pursuant to a resolution of the Morris County Board of Agriculture, recommended the appointment of a committee to audit the Treasurer's accounts.

The Committee on Resolutions was then discharged, with the thanks of the Board.

Mr. Parkhurst reported, for the Nominating Committee, the following nominations of officers for the ensuing year: For President, Hon. D. D. Denise; Vice President, Prof. E. B. Voorhees; Secretary, Franklin Dye; Treasurer, William R. Lippincott; Executive Committee, H. F. Bodine, Walter Heritage, J. B. Ward.

Mr. Decamp—We find that, under the present law, the office of Secretary of this Board should be held for five years, and I would move that the term of the Secretary be made five years, beginning this year.

Agreed to.

On motion, the report of the committee, as amended, was adopted, and the officers named declared elected for one year, except Mr. Dye, for Secretary, who was declared to be elected for five years.

The officers elected expressed their appreciation of the honor conferred, and the meeting then adjourned to meet at 7:45 P. M. in the Auditorium of the State Normal School.

At 7:45 P. M. the meeting was called to order by the President in the Auditorium, State Normal School, introducing Professor Green, Principal, who spoke on education for farmers' children. This was followed with an address by Dr. Fairchild, of Kansas. (See address.)

After the address, adjourned to meet in the Chancery Court room, State House, at 9:30 A. M., January 14th.

THIRD DAY.

MORNING SESSION.

The meeting was called to order at 9:30 A. M. by President Denise, introducing Rev. D. R. Foster, pastor Bethany Presbyterian Church, Trenton, who opened the session with prayer.

The following resolution was offered by Mr. Cox:

Resolved, That the State Board of Agriculture desires to express its gratification that the Governor has recommended the establishment of traveling libraries in New Jersey, and its earnest hope for the early appointment of a Library Commission (to serve without

pay), whose business it shall be not only "to make rules and regulations for the purchase and distribution of traveling libraries," but also to furnish all proper information and aid toward the establishment, under excellent laws, of free public libraries in all the various municipalities of the State.

Mr. Cox moved that this resolution be adopted without reference, and said—Under the present law there is a public library located in the Capital of the State, open to all citizens, without charge, but to those who do not live near, it possesses little interest.

This is all right, as far as it goes, but it does not go far enough. We want free public traveling libraries, handled by a commission appointed for that purpose, accessible to the people in every hamlet in the State. This is in direct line with the improvements of the day, and the farmers of the State are entitled to this privilege. No one should object to a law framed on this resolution, making it possible for people living in the rural districts to be favored as they cannot be now.

The Secretary—I see Dr. Thompson in the room, and would like to have him state briefly the character of this movement and its progress elsewhere.

Dr. Thompson—The traveling libraries have been introduced in some of the States in New England and in some of the Western States.

Fifty books are purchased—such books as people love to read—and these are sent to a certain locality, in charge of someone who will take care of them. When these books are read another box is sent, and so on, the first set being sent to other localities.

The Governor has recommended this in his recent message, not only for traveling libraries, such as I have spoken of, but also for municipal libraries for every municipality in the State, if they care to vote for it. In Massachusetts there are some hundreds of such libraries—in fact, all the towns but about two per cent. have them now.

This resolution provides that a commission be appointed for this purpose, to follow out the Governor's suggestion, and establish these traveling libraries.

Dr. Fairchild—It may be of interest to this assemblage to hear something of these traveling libraries in New York. Last month I met a gentleman who has charge of the traveling libraries in Albany. It is certain, to those connected with them, that these libraries have done much to awaken an interest among readers in the rural districts,

and, I have no doubt, from the information given me, that they will be successful wherever introduced.

Mr. Lindsley—Several years ago our Legislature made an appropriation, and provided that whenever a school district wanted to raise a sum of money to be expended in books the State would give an equal amount for the same purpose. You will find this under an amendment to the old school law. You will also find in almost every school district in the State that they have taken advantage of this law, and have already established free libraries for the people of the district. Money has been furnished by the children and parents and those interested in the education of children, and the State has furnished an equal amount for the purchase of books for this purpose. Many of the school districts have large libraries, and almost all have some books.

As these libraries are supplied with books of a scientific character, books of literature, and of the best kinds, it seems to me that many localities are already well fixed in this direction, and if there were more encouragement given under this law and people took a proper interest in carrying out the law as it stands, it would be better than if some new law were enacted and the whole matter placed in the hands of a commission so far away from home.

Mr. Cox—In answer to Mr. Lindsley, I want to say I think he misapprehends the case when he says every school district has such a free library. These libraries are for a special purpose only, and if they have one hundred books or more they always have the same one hundred books, and no others, unless they buy them. Under the proposed scheme of traveling libraries communities can, without any additional expense, have these libraries changed every three months, or as often as they wish. It is a great improvement over an established library. The present school library is great, but this is greater. You had better dispense with the present free public school libraries than dispense with this form.

Mr. Demarest—My understanding of the school libraries, as at present established, is that they are for the sole use of the pupils attending the school. In some districts they may allow the inhabitants to read the books, but the understanding, under the law, is that these books are for the use of the pupils only.

The resolution was then adopted.

Mr. Dickinson, chairman of the Committee on Credentials, then

reported all the organizations represented, and of the entire membership elected but two representatives absent, and stated that since he had been on this committee he had never before been able to make such a complete report, and it is extremely gratifying to note such a full attendance.

The report was received and the thanks of the Board extended to the committee for their work.

Mr. Gillingham presented the report of the Committee on Officers' Reports, commending the several reports and calling attention to the more important suggestions requiring immediate attention.

They also took exception to the price of wheat as reported by the Secretary, believing that 90 cents per bushel would better represent the price for the State than does 96 cents. (See statistical report)

The Secretary—Before the report is adopted, I want to ask the representative farmers here, those who grow wheat, about the average price of wheat. I note the committee have recommended a change in the price as quoted in my report. This report was made up from the reports sent in by the Secretaries of the County Boards, and we want to feel that the Secretaries of these boards are reliable.

Mr. Gillingham—The change was suggested by members of the committee from three different sections of the State.

The Secretary—I do not wish to see anything misrepresented, but this is quite a reduction from the average figures reported to me.

Mr. Lewis—Probably at the time the report was made 96 cents was about the right price, but the change in the price since makes 90 cents more nearly correct.

Mr. Coles—We took into consideration the fact that quite a block of wheat was sold right out of the field when the price was only 65 and 70 cents per bushel.

The report of the committee was then received and a vote of thanks was extended to the committee for their work.

The Chair—There was a resolution passed appointing a committee to make a special examination of the Treasurer's receipts and expenditures, and I will name on that committee Messrs. George L. Gillingham, Lecturer of the State Grange; Samuel B. Ketcham, President of the State Horticultural Society, and Hon. John D. Rue, ex-State Senator from Mercer county.

The next item was an address on "Suitable Manures for Fruits,"

by Prof. H. E. Van Deman, late United States Pomologist. (See address.)

Prof. Van Deman's address was followed with an address by Dr. Fairchild, entitled "Thrift on the Farm." (See address.)

After Dr. Fairchild's address Governor Hoard made some remarks on "Selecting of Seed Corn" (which see).

Mr. Gillingham—Your committee appointed to examine the accounts of the Treasurer beg leave to report that we have examined the accounts of the Treasurer, William R. Lippincott, and compared them with the vouchers in his hands, and find them correct. And your committee feel that the thanks of this Board are due Mr. Lippincott for the careful manner in which the accounts have been kept.

(Signed) GEO. L. GILLINGHAM,
S. B. KETCHAM,
JOHN D. RUE,
Committee.

On motion, the report was accepted and the committee discharged, with the thanks of the Board.

Mr. Lippincott—Your committee appointed to draft resolutions upon the death of our late member, I. W. Nicholson, beg leave to report the following:

WHEREAS, It has pleased God, in His infinite wisdom, to remove from our midst our beloved friend and fellow-worker, Isaac W. Nicholson, and while we bow in humble submission to the Most High, be it

Resolved, That the members of the New Jersey State Board of Agriculture deeply regret the loss of a man who was ever active in promoting the welfare and happiness of his fellow-men, and in advancing the best interests of his county and of his State. Generous, kind-hearted and public-spirited, he was most endeared to those who knew him best, by his personal worth and a long career of usefulness.

Resolved, That this resolution be spread upon the minutes of the annual meeting of this Board, and a copy be sent to members of his family.

(Signed) WILLIAM R. LIPPINCOTT,
JOHN M. LIPPINCOTT,
SAMUEL S. BATTEN,
Committee.

The report was unanimously adopted.

The Chair announced the following Committee on Legislation. (See list of committees.)

The Chair—I wish to extend my thanks to the committees for the manner in which they have performed their duties. The Executive Committee feels much gratified also at the large attendance at our sessions this year, and we are glad to see you. We trust the attendance has been as gratifying to you as it has been to us.

Mr. Ketcham—This has certainly been the most interesting meeting we have ever had, I am sure, and I have been connected with this Board for many years.

I think we owe a great deal to the officers of this Board for the selection of the speakers and for the preparation of so interesting a programme. I think our thanks are due them, and I therefore move that we extend a vote of thanks to the officers of this Board for what they have done in making this meeting one of unusual interest.

Motion put by Mr. Ketcham, and unanimously agreed to.

Mr. Ketcham—Mr. President and other officers of the Board, you have our sincere thanks for what you have done to make this so interesting an occasion. [Applause.]

The meeting then adjourned *sine die*.

FRANKLIN DYE,
Secretary.

J. S. ROGERS,
Official Stenographer.

REPORT OF THE EXECUTIVE COMMITTEE.

Your committee have held six meetings throughout the year in the interest of the work of the Board.

In February the President was sent as a delegate to the meeting at Washington, D. C., called to consider the question of Congressional legislation to prevent the dissemination of fungous and allied tree troubles by natural law. A bill was devised and introduced in the House to cover the question, but as yet it has not been enacted into law.

The President and Vice President were about the same time appointed a committee to secure, if possible, correct portraits of all the Presidents of this Board from its organization down to this quarter-century meeting and to have suitable copies of each made and framed. This has been done, and we invite the members of the Board to inspect these portraits in the Secretary's office.

Having received diplomas for meritorious exhibits of fruits, vegetables, &c., at the Columbian Exposition, for displays made by our farmers and fruit-growers, these diplomas were also ordered to be placed in suitable frames, and they are thus preserved for your inspection and for future reference by those who may come after us.

The meeting of the Farmers' National Congress, at St. Paul, Minn., at this particular period of our national development was considered to be of sufficient importance to have this Board represented there. The President and Secretary were sent by the committee as our representatives. Other delegates nominated by our Secretary at the request of the Governor were commissioned by his Excellency to represent the State. A brief report of the meeting will be found in the report of the Secretary to the Governor.

The committee held one meeting during July 12th and 13th, at Phillipsburg, Warren county, and Newton, Sussex county, for the purpose of inspecting the condition of agricultural progress and the methods of practice pursued by the farmers in the localities visited.

The Washington Valley, stretching across the southern border of Warren county, is proverbially beautiful and productive—beautiful in natural formation and scenery; beautiful, also, by reason of the well-kept farms and farm buildings, most of the latter being painted.

The herds of dairy cows grazing on many substantial pastures gave

evidence of thrift, of soil improvement and prosperity. The general appearance of most of the farms in this section impressed us as being well managed. The main farm crops were hay, grain and dairy products, very little truck of any kind being raised in this section, and the number of fields in grass clearly indicates how the fertility of the land was maintained.

Now and then a fine peach orchard attracted our attention, and prospects seemed favorable for a crop of fruit. Apples were not generally plentiful, but pears looked promising. Returning to Washington, we received a polite call from Hon. Johnston Cornish, who informed us that his factory was running on full time, employing 400 hands, and at least one-half of his organs that found sale in this country were purchased by the farming community.

From Washington we went to Newton, in Sussex county, where we met a kind reception, Judge Martin being so courteous as to accompany us on our ride through a portion of the county, while he pointed out to us beautiful hills and fertile valleys, that made us think of Switzerland; but the cattle in the meadows were not Swiss cattle; they were nearer Guernsey and Holstein, as this is a great dairy section.

We visited the farm of Franklin Roe, who has made a specialty of Holsteins, breeding for butter qualities in order to obtain a large flow of rich milk, and he seems to have been very successful, as he pointed out quite a number of cows with great butter records that were very heavy milkers. Mr. Roe was bottling the milk from about thirty cows and shipping it to a dealer in Brooklyn, receiving two and one-half cents per quart, the dealer furnishing the bottles.

He said bottling the milk was far more profitable than shipping it in cans where the shipper had to furnish them. The bottles were quickly washed by brushes rapidly revolving, and the appointments of the dairy were such that the work of the farm was mainly done by the proprietor, with the help of two hired men.

In an interview at Newton with the editor of the "New Jersey Herald," we were kindly informed that farming in the vicinity was carried on mainly by the native population, and very little foreign help was to be found in the neighborhood. It was also stated that at least 25 per cent. of the farms were rented or farmed on shares, and, considering the condition of the times, this method had been fairly satisfactory to both landlord and tenant.

One thing was prominent in all this journey; it was a rare thing to see a dilapidated set of farm buildings, and the county town, Newton, is a rural gem set among the hills—a thriving, well-kept town, in whose appearance and good reputation the inhabitants seem to take special pride. When this is the case in town or country, improvement, popularity and stability will follow.

As we rode mile after mile through well-kept farms, which show how the owners have made use of every means in their power to hold their own through years of discouragement, a great truth is clearly demonstrated—that upon such men as are to be found here the stability of our government rests. Living plain but honest lives, modest in prosperity, patient and hopeful in adversity, the provident and careful farmer must necessarily be a thoughtful man, for he lives not merely for the present, but, with provident forecast, makes arrangement for the future. And of all New Jersey has ever raised that pertains to agriculture, the farmers themselves have proved her noblest product.

A similar meeting to the one described, and for business purposes, was held by invitation of the Treasurer, William R. Lippincott, at his house on August 26th. He grows a variety of crops, chiefly fruits and vegetables, and his excellent wife, our hostess, gives attention to floriculture in connection with household duties, supplying regularly throughout the year a stand in a Philadelphia market. Mr. Lippincott finds it profitable to produce, as far as he can, everything that the farmers' market for city customers should have. And the sales made and the prices received show that there is money to be made in farming if rightly managed. During this visit the large fruit orchards of Emmor Roberts & Son were visited. Here was found fruit in great variety, the old varieties of apples producing abundantly on trees of giant growth, while alongside the newer fruits also doing full duty for the owner. Peaches in great variety and pears of exceptional size and of rare beauty and flavor were abundant. In fact we have not found in this or any other State pears so symmetrical in formation, so clear of skin, almost transparent and free from blemish of any kind. Here, too, were plums in variety, profuse bearers, blackberries and raspberries, gooseberries and currants.

The soil occupied by these extensive orchards seems to be particularly well adapted to the production of fine-flavored and beautiful fruit, provided the owner knows how to feed and care for both trees

and fruit. And the Roberts, both father and son, seem to have well-nigh mastered the problem "How to succeed in fruit-growing."

There have been some cases of swine disease reported to the committee during the summer, and in connection with these the belief has been expressed that hogs fed on hotel waste were more generally affected than were those fed on better-balanced and more wholesome foods. Acting on these reports and suspicions the committee have requested particular information from certain localities concerning the matter, and, briefly summarized, the facts are as follows:

"In 1895 six gentlemen had hogs boarding at a certain place in West Asbury Park, being fed on hotel waste, and from a total of fifty-three, forty-seven died. In 1896 three had theirs at the poor-farm at Asbury Park, and, including those belonging to the keeper himself, lost 152 from 156. In 1897 eleven had theirs at West Asbury Park, and from a total of 153, 124 died, either at the boarding place or after reaching home, from the disease."

While the above is but a brief statement, giving the total number of hogs lost by certain farmers who had had them boarding near the shore so as to utilize the hotel waste there, other facts are brought out in the detailed report, such as that when the hogs were brought home from these boarding places affected, the disease was communicated to other herds, in numerous instances affecting the whole neighborhood. The owners, too, are positive in their convictions that the hotel waste was the cause of disease among their hogs.

From our investigations, having now, as we believe, a clew to much of the trouble experienced among swine-growers for a number of years past, it will be possible to make such further investigations and experiments as may aid in preventing loss from this cause in the future.

Pending this investigation by your committee, a bulletin (141) was received from the Cornell University Experiment Station, entitled "Powdered Soap as a Cause of Death Among Swill-fed Hogs." It seems from this bulletin that the attention of the Station named has been directed to the subject of your committee's inquiry during the year, and with their exceptional facilities for scientific, accurate investigation they have given a valuable exposition of the subject. We recommend all growers of swine to procure and study the bulletin named.

From it we make the following extract containing the analyis of the soaps used in the experiments, and the conclusions deduced therefrom by the Station.

CHEMICAL ANALYSIS OF THE SOAP POWDERS USED.

"In order to ascertain the chemical nature of these soaps they were submitted to Mr. George W. Cavanaugh, Assistant Chemist for the Agricultural Experiment Station, for analysis. The following report was received:

"The soap powders used in the above experiment are mixtures of ordinary hard soap, that has been powdered or in some way reduced to a fine condition, and sodium carbonate. Sodium carbonate is known in commerce as sal soda, washing soda or soda. In water it forms a caustic solution, which is the lye used in making the old-fashioned hard soaps.

"*Analysis.*

"Soap A	49.60	per cent.
" B	55.42	" "
" C	55.54	" "

"(Signed) GEO. W. CAVANAUGH,
"Assistant Chemist."

A careful inquiry has been made to ascertain the quantity of these soaps commonly used in washing dishes. This has revealed the fact that while the amount used by different individuals varies, the quantity is large, usually far in excess of the amount prescribed by the manufacturers. Thus I have been told, by thoroughly reliable people, of dish-washers who would use one-third of a box in cleansing the dishes after a single meal. While this is extreme, it is said not to infrequently happen, and it is easy to understand that the swill from these kitchens would contain far more of the alkali than we found necessary to produce fatal results. Should such excess in the use of these cleansing agents be indulged in for several days in succession, we have, in the light of the foregoing experiment, a cause for many fatalities among the hogs fed upon the dish-water.

In view of this danger it seems better to abandon altogether the habit of giving dish-water to hogs. Although the feeding of garbage is generally condemned, the scraps of vegetables and table refuse could, perhaps, if properly collected, be used with safety. But certainly pure water is a much more wholesome drink, even for swine, than dirty dish-water. When the subject of "swill feeding"

as a business is studied and the conditions as they exist are understood, the wonder is, not that some of the hogs die, but rather that any of them live.

It is not presumed that the poisoning by carbonate of sodium is the only cause of death among swill-fed hogs. Other destructive agencies are liable to be found in the decomposing garbage. The results of the investigations which the necessity of good farm hygiene demands will very likely disclose the specific nature of many of them. Another fact worthy of consideration is that the investigation of the last year shows that nearly all of the outbreaks of hog cholera and swine plague which came to our attention started among herds of swine fed upon garbage and swill collected from the sources above mentioned. This is significant, and it points to the miserableness of feeding garbage to animals. In fact, if the total losses it occasions are counted, it is questionable if anything is gained in this attempt to save waste products. It is stated in the official reports of the United States Department of Agriculture that in 1896 12 per cent. of the hogs in this country (which amounts to 5,440,176) died from disease.

Again, it has long been recognized that the feeding of garbage to hogs furnishes one of the most favorable channels for the introduction of hog cholera and swine plague bacteria. As a rule, wherever we find hogs in clean, well-ventilated pens, and fed upon wholesome food, we find thrift and health, and, conversely, where these animals are surrounded with disgusting filth, and fed upon decomposing slops or other unwholesome food, we expect to and often do find disease.

It is unfortunately becoming a too prevalent habit among our farmers to assume, as soon as one or two pigs die, that some infectious disease, such as hog cholera, is among them. It is further most unfortunate that they frequently entertain the fatalistic notion that a remedy is beyond their reach. Fully 25 per cent. of the outbreaks of reported hog cholera which we have investigated during the past year have not been hog cholera or any other known infectious disease. While it is true that when hog cholera becomes well established in a herd there is great danger that the majority of the animals will die, it is equally true that if the disease is not a genuinely infectious one that a majority of the animals can, by proper treatment, be saved. When a pig sickens and dies the thing to do is to examine, or have it carefully examined, to find out if possible what the cause of death is, in order that the best methods known for preventing the further spread of the disease may be promptly adopted.

If the examination shows the disease to be hog cholera, swine plague or any other infectious disease like anthrax or tuberculosis, the as yet uninfected and apparently well animals should be placed in other pens and the old ones disinfected. The animals should be given easily-digested and nourishing food, plenty of sunlight and pure air. If others should become affected, the well ones should again be separated from the sick. The channel or way by which the specific cause of the disease got into the herd should be diligently sought for. As the most common way is through the food, it is always a safe precaution to change the diet.

It is certainly not desirable to acquire the reputation of having an infectious disease among one's animals when the real trouble is due to poor hygiene, to some irregularity in their care or to an accidental poisoning. If the diagnosis cannot be positively made, it is best to put the apparently well hogs in a separate pen, provide them with good ventilation, wholesome food and cleanliness. *It is important that the food should be changed.*

By carefully observing the method of *strict isolation*, disinfection, healthful surroundings and nourishing diet, many epizootics of infectious diseases have been checked, and it is safe to presume that if such precautions were rightly adhered to nearly all of the losses now sustained from dietary causes would be saved. The observance of the rules necessary for the promotion of good health among mankind applies with equal force to the lower animals.

CONCLUSIONS.

From the foregoing the following conclusions seem to be warranted:

1. The greatest amount of loss sustained from swine diseases in this State is from hogs fed upon the swill collected from hotels, boarding-houses and other large institutions.

2. The cause of death in certain outbreaks of disease among swill-fed hogs is the direct poisoning of the animals by the excess of free alkali (washing soda) in the swill. These alkalies come from the powdered soaps used in washing dishes.

3. It appears that small quantities of the powdered soaps do not produce immediate bad results. It is presumable that they can be used in quantities sufficient for the needs of cleanliness with perfect

safety, but owing to the danger involved in their use it is safer not to give the water containing them to animals.

4. In addition to the unwholesomeness of garbage and kitchen slops for animal food, and in addition to the losses sustained from the immediate effect of such kinds of food, hogs fed upon it are very liable to contract specific infectious diseases, such as hog cholera, swine plague and tuberculosis.

5. The enormous amount of loss among garbage-fed hogs, which in this State alone aggregates thousands of dollars annually, suggests the desirability of urging the discontinuing of the practice of collecting swill for such purposes. Certainly, if the refuse material is to be used for feeding swine, it should be collected and fed while fresh and sweet. When possible, it should be kept dry, and by all means free from alkaline dish-water. It is advisable to cook all kitchen or table refuse before feeding it, in order to remove the danger of infection from specific diseases. The only suitable channel for the disposal of dish-water is the sewer.

NEW YORK STATE VETERINARY COLLEGE,
CORNELL UNIVERSITY.

ITHACA, N. Y., Oct. 20th, 1897.

Your Executive Committee fully indorse the recommendations above made. Better by far discontinue the feeding of kitchen and hotel slops, as well as other garbage, to swine than by so doing, in the aim of apparent economy, jeopardize the health and life of our otherwise valuable pork product.

The committee are much encouraged by the interest manifested in the Farmers' Institutes. We are informed that these meetings have generally been better attended than in previous years, and as the farmers of the State understand more fully the purpose of these meetings and the benefits possible to them when they take active interest in them, we are confident that they will more and more avail themselves of these opportunities for improvement—opportunities, indeed, that bring the best information available within easy reach.

It is the hope of the committee that these institutes may be increased in number and efficiency and that the farmers in every locality where meetings may be arranged for will co-operate in every possible way to make them practically helpful.

The County Boards of Agriculture, being an integral part of the

State organization, should receive more encouragement than they now do in the several counties. The farmers cannot afford to ignore these and other permanent local organizations whose purpose is to improve the knowledge and practice of agriculture.

While the past year has not brought to every tiller of the soil increased financial gain, the general improvement in price of much that has been grown upon our farms has given a stimulus to renewed exertion in future work and with the confident hope of more profitable returns.

This year's annual meeting marks the first quarter-century of the history of this Board. From a small beginning it has grown to its present proportions of numbers, standing and usefulness. Its future will depend largely upon the farmers themselves.

Much of its immediate and all of its more remote future history will be made by the younger farmers of the State. The supreme effort should always be to keep the Board strictly to the purpose and work for which it was organized. Capable, representative men, whose interests are identified with agriculture, duly elected by the county organizations to represent them in the Board, can do much to make each annual meeting fruitful in practical benefits to the agricultural industry of the whole State.

Since our twenty-fourth annual meeting another valuable member of this Board, always active in advancing its interests and the interests of farmers throughout the State, has passed away. The cheerful, familiar face of Isaac W. Nicholson will be seen among us no more. We suggest that a suitable resolution be drafted in expression of our appreciation of his worth and of our great loss, and presented for adoption and record by the Board.

In presenting a list of subjects for your consideration at this meeting, with speakers chosen, your committee has endeavored to hold to those questions which have paramount interest, both for the present needs and the future demands of our business. Some of the speakers are known to many of the members, and their past record is guarantee of present ability.

It is our earnest hope that this meeting may be equal to, if indeed it does not exceed, those that have preceded it in interest and value. We close this annual statement expressing the hope that the year now begun may be a very prosperous one to the farmers of New Jersey.

Emmor Roberts—If in order, I would like to make a few remarks in relation to matters mentioned in this report, as that of hog cholera and the feeding of slops. I have had some experience in that line I will give you. I am connected with a concern in Delaware county, Pennsylvania, where they have a large household, and where the refuse from the house was fed to the hogs, and all the hogs died. I am also connected with another concern across the river, at Newtown, known as the George School, where the hogs were similarly affected. They were also fed the garbage from the house. Not knowing what to do, it was suggested the garbage be fed on the ground and allow the hogs to make their own selections. Since that they have all lived and flourished. If this garbage is fed on the ground the hog will discriminate, and will pick out what seems desirable to him. We have fattened two or three lots since, and they have done admirably on the house garbage.

When I received the bulletin named I sent it to our farmer there, and told him that seemed to explain all our trouble.

There is also, near my own home, a large establishment where the hogs are fed with garbage hauled from the city, and the hogs thrive admirably, and there is no cholera. They are fed on refuse hauled from the city exclusively. I am told that in hauling this refuse from the city to this establishment, as soon as they leave the city a few miles, they draw a plug out of the wagon and allow the liquid to drain out along the road, and when it reaches the place it is dry, comparatively. This is fed to the hogs on the floors, and not from the troughs, and the result is entirely satisfactory. In our experience at the school we stumbled on this method of feeding because we thought it a shame to waste the refuse. This is a wonderful lesson we are learning, although these men who have been feeding garbage have learned the lesson ahead of us and are having no trouble.

The Chair—This is a very important question. In Monmouth county we have suffered greatly from feeding garbage to the hogs, as stated in the report just read. Some of us sent our hogs down to the shore to be boarded on slops from the large hotels, and when they came home they brought the disease with them. Most of the outbreaks came from hogs that had been down to the shore, and if there is any way slops can be fed, without being injurious, it is important to know it. If they have herds on the outskirts of Philadelphia, fed entirely on garbage, and have no trouble with them, this experience is most valuable.

Mr. Roberts—At the institution I have referred to we are feeding the hogs in the same pens in which the others died, and have no trouble with them now. The idea is for the hogs to pick and select the solid portions and allow the liquid portions to drain off into the ground.

Mr. Rorer—There is one reason the hogs are not fed this way in Philadelphia, and that is because the authorities will not let them. This feeding of hogs with garbage was formerly carried on very extensively and with good results, but the Board of Health prohibited it. A large number was formerly fed in this way at the House of Correction, but this was stopped, too, as it was claimed that if the city did this itself it could not stop others. This is all done now outside of the city, but the garbage is not fed in troughs, but on the ground.

Mr. Lindsley—There is something in this feeding that needs explaining. One of my neighbors feeds garbage from the city of Morristown, and he had this experience: He fed it in the troughs, and a great many of his hogs died, and he feared be must quit it. He then abandoned feeding them in the troughs and gave them nothing to drink but water, spreading the garbage on the ground. He has had no further trouble, and he has been feeding in this way for five or six years now. He is growing rich at it.

The Secretary—Our report refers to this. The solid portion of the garbage should be separated from the liquid and fed while fresh.

Mr. W. R. Lippincott—Mr. Roberts has reminded me of the fact that I bought seventeen pigs last year from the establishment he refers to, where garbage-feeding is practiced. I had no trouble with them at all. These parties seem to have very fine hogs, and all were doing nicely. I also noticed among this garbage a large amount of broken glass, broken crockery and such stuff, but they don't seem to be hurt by it, as they pick out what they like, and the rest is allowed to lie on the ground. I noticed, also, that it was all fed broadcast on the ground, but I did not know, until Friend Roberts mentioned it, that they drew the plugs from the wagons on the way home and allowed the liquid to drain off.

Mr. Roberts—I knew nothing of this until a few weeks ago, but it is evidently of importance.

The Chair—The sentiment brought out this morning is that the feeding of garbage is all right if not fed in troughs. This is an important point, and should be well looked into.

Mr. De Cou—I am not much of a hog-breeder, but I live near the New Jersey State Asylum. They feed large numbers of hogs on garbage, and have lost a great many, while people living around them, keeping but two or three hogs, feeding the same garbage, have lost none. They have the best of care at the Asylum, with the best of veterinarians, while these owners of a few hogs each give but little care and attention, and yet their hogs are in fine condition; hogs fed on grain cannot keep up with them.

The Chair—Can you explain any difference in the manner of feeding? Are the hogs fed in troughs?

Mr. De Cou—Yes. I know of another case where the hogs were fed on corn rations, and they died of hog cholera.

The Secretary—That may be the genuine hog cholera, while this trouble caused by feeding slops does not seem to be hog cholera.

REPORT OF THE SECRETARY.

The total farm valuation of lands, fences and buildings in New Jersey given by the United States census of 1890, is $159,262,840. Implements and machinery, $7,378,644; live stock, $15,811,430. A market value estimate made now would, no doubt, very materially reduce the first item named, and possibly the last as well. By the same census we have a total of 30,828 farms, with an average size of 86 acres, and of this total acreage about 24 per cent. is unimproved, as wood, natural meadow and swamp land.

To aid in furthering crop production, the farmers of the State expend over $1,500,000 annually for commercial fertilizers. Much of this annual outlay might be prevented if better management were exercised in the saving of farm manures. Competent judges estimate this loss to be more than the outlay for commercial fertilizers. This is a question that should receive by our farmers the study and care its importance demands. Even though it should be deemed advisable to continue this outlay for fertilizers, the home-made manures, properly cared for and applied, would augment crop yields enormously.

For the current year the agricultural interests of the State have, to a greater or less degree, according to the particular branch of the industry followed, felt the business revival occasioned by the rise in the price of wheat; and producers who have had any considerable acreage of this crop are benefited directly, others relatively.

Although wheat is not our chief staple, the yield for the State, considering the diversified character of our products, is very encouraging. The average yield per acre for 1897, as given by Secretaries of County Boards, is larger than in any previous year reported, being 20.7 bushels. Numerous instances are reported where the yield per acre has run up to 40 and 45 bushels.

Taking the acreage for the State as given in the United States census of 1889, it gives us, stated in round numbers, a total yield of 2,500,000 bushels, an increase over last year of about 729,420 bushels.

The average price for the State October 15th was 96 cents, giving a total value to the crop for New Jersey of $2,400,000. Taking the increased yield at the price given and the advance in price over last

year for that much of this year's crop gives the State more than $1,000,000 addition to its income from this source for 1897. It should be remarked that the acreage of wheat in New Jersey has been declining for a decade or more past, while the yield per acre has been increased by better methods, an evidence of progress worthy of emphasis.

Rye is 16 bushels per acre, with a total yield of 135,920 bushels; price per bushel, 46 cents. Oats, 27 bushels per acre, and a total yield of 3,275,829 bushels; price, 29 cents. Buckwheat, as given by the Government, is 16 bushels per acre. Corn, owing to wet spring and early summer, was retarded in early growth, and the same cause contributed to a heavy growth of weeds, which, owing to the wet condition of the soil, it was impossible to eradicate. These causes have contributed to a lower yield than usual in many localities. The total acreage devoted to this crop is 267,648 (census 1889). The average yield per acre, as estimated by the Government Department of Agriculture, is 32.6, or a total for the State of 8,530,794 bushels. Exceptional yields are reported of 75 bushels per acre.

The yield of hay is larger than usual, owing to abundance of rain prior to mowing time. Clover, timothy and mixed give an aggregate yield of 458,267 tons, equal to 1.66 tons per acre. Owing to decreased demand for horses in our cities, the price of this staple is lower than formerly, running from $6 and $7 for clover to $10 and $12 for timothy in the market, or an average *farm* value of about $8 per ton; total value, $6,565,784.

The white and sweet potato crops were as much below the normal yield per acre in 1897 as they were above it in 1896. The Government report gives 68 bushels per acre as the average yield of white potatoes for the State. This is much below a good normal yield. There have been yields this year from 100 to 175 bushels per acre under favorable conditions. Sweets are 72 bushels per acre, average for the State.

Estimating the white potato crop for the State at 68 bushels per acre, or about one-third less than a fair normal average yield, gives us 2,703,901 bushels for the year 1897. Sweets at one-quarter less, or 72 bushels per acre, will give a yield of 1,690,758 bushels for 1897. The advance in price for these products is a natural result of a general short crop, as other States are similarly affected.

The apple crop is below 50 per cent. of an average yield, or about 45 per cent. Peaches were a large crop; too abundant, indeed, for a profitable return. With fruit thickly set, excess of wet weather early in the season and hot weather at ripening time, much of the fruit was prematurely ripened, of poor flavor and color. The full returns for our peach counties will be presented when the reports are collected from the different shipping points. The growers of small fruits and tomatoes had a similar experience, and the tomato-canning industry has been reduced lower than ever before.

Even though a fair estimate of the crops named were given, they would not, by a large per cent., represent the full annual crop yield and value for the State. The truck farm, market garden and greenhouse industries have an annual output of hundreds of thousands of dollars. To this should be added the pork, beef, veal, early lamb, mutton, poultry and egg productions. These can be estimated only, as no provision is made by State law for collecting statistics of agricultural productions, and the United States Department of Agriculture confines its researches mainly to the general products of the country.

For summary of crop yields, values, &c., see table below:

Total number of farms, 30,828.

Average expenditure for commercial fertilizers, $60 per farm, or a total of $1,849,680.

CROP YIELDS AND VALUES.

Wheat acreage, 121,570.
Yield per acre, 20.7 bushels.
Total yield for State, 2,504,342.
* Average price per bushel, 96 cents, $2,404,178.32.
Total crop of 1896, 1,774,922 bushels.
Total value, at 70 cents per bushel, $1,242,445.40.
Increase in yield in 1897 above 1896, 729,420 bushels.
Increase in price for crop of 1897, $1,161,732.92.
Rye, acres, 77,245; 16 bushels per acre; total, 1,235,920 bushels.
Total value, at 46 cents per bushel, $568,523.20.
Oats, acres, 121,327; 27 bushels per acre; total, 3,275,829 bushels.
Total value, at 29 cents per bushel, $949,990.41.
Buckwheat, acreage, 13 520; yield per acre, 16 bushels; total, 216,320 bushels.
Value, at 43 cents per bushel, $93,017.60. (Acreage believed to be too high for this date.—SECRETARY)

* These prices were given in November, 1897. At the annual meeting, January 12th to 14th, 1898, the Committee on Officers' Reports thought the price of wheat as given was six cents per bushel too high. This would make a difference of about $150,000 in total value. (See Report on Officers' Reports)

Corn, acreage, 267,648; 32.6 bushels per acre; total yield, 8,725,324 bushels.
Total value, at 35 cents per bushel, $2,953,663.40.
Hay, all grades, acreage, 458,267; 1.66 tons per acre; total yield, 820,723 tons.
Total farm value, at $8 per ton, $6,565,784; total, $13,535,156.93.
Estimated yield of white potatoes, 2,703,901 bushels.
Estimated yield of sweet potatoes, 1,690,758 bushels.

NOTE.—The number of farms for the State and the acreage for crops named are taken from United States census 1889-90. For further crop statistics, see State statistical tables for farm crops.

DISEASES OF FARM ANIMALS AND THE PURITY AND HEALTHFULNESS OF THEIR PRODUCTS.

The laws for the suppression of disease among farm animals and for the maintenance of pure and healthful products of meat, milk and butter are the outgrowth of new demands and comprise different enactments of several past years. These commit various branches of this general work to at least four different Boards and State officials. All these are working in harmony and in conjunction the one with the other, as far as is possible, to secure the one great end contemplated by the laws referred to.

That part of this work committed to the Tuberculosis Commission, of which the Secretary of the State Board is made a member by law and its Secretary by election, I may be permitted to refer to briefly in this report. Tuberculosis among dairy animals is one of the new demands referred to. That it has increased in some sections of our State for some years just passed is evident from what is brought to the attention of the Commission.

The causes contributing to this are several. I need not discuss them here. That the disease, in its *advanced* stages, when found in certain organs, is prejudicial to human health makes it important to have some supervision over meat and milk-producing animals by the State. This supervision, if rightly conducted, must necessarily include also the buildings, stables, food and drink, and also methods of the owner.

All this the Commission has endeavored to do. It will be seen, therefore, that while removing from all herds brought to its attention animals that are believed to be capable, either by their meat or milk, of communicating disease to the consumers of either, on the other points named the work is educative in its character.

In most cases, until the Commission has made an investigation, the owner does not know what is the matter with his animals nor the cause or causes producing the trouble. Having these pointed out and directions given for bettering the conditions with the removal of animals believed to be capable of further spreading the disease, he is culpably neglectful if he does not *immediately introduce and maintain* the improvements suggested to him.

If this in all cases is done, a few years will show a very marked advance in the condition of dairies that are now below what they ought to be. The consumers of meat and milk have also a vital interest in the purity of these products. The total sum set apart by the Legislature for this especial work is $5,000 per year. With this amount, with the most exacting economy of expenditure, the Commission has been able to carry on the work for only about eight months of the year. For details of the work done see report of the Commission.

Hog cholera and other diseases have invaded some localities, destroying many herds and making serious inroads into others. Although not so widespread as last year, it is a scourge that should be, if possible, overcome. The annual product of swine has been running down for a number of years, thus decreasing the consumption of corn and reducing the farmer's income, both from the decreased market for his corn and the loss of the pork crop.

The Executive Committee of this Board is at this writing making some investigations with the purpose of finding the cause or means of its dissemination, if that is possible. A statement of these investigations, with the conclusions reached, will be found in the report of the Executive Committee preceding this report.

DAIRY BUSINESS.

This has increased to such an extent, in recent years, in sections of the State adapted to it, as to become a leading industry. This increase is not due so much to exceptional profits of this business as to the fact that other branches of agricultural work had ceased to yield any profitable return. If the increased price of grain should become permanent it is not likely that there will be any great extension of the dairy business within our State for some time to come.

The scarcity of cows, referred to in my last report, will, with the

present advancing rates of dairy foods, enhance their price. It is impossible to state, except approximately, the annual output of our dairies. The United States census of 1890 gave as the total number of milch cows for the State 161,576, and a total milk yield of 256,015,812 quarts, or equivalent to 1,584 quarts per cow annually. If we consider the period of lactation to be 270 days, this would be equal to about 5.86 quarts of milk per day.

At the present time, there are in the State, in round numbers, 200,000 milch cows. On the same basis of yield, this would give annually a product of 316,440,000 quarts of milk. Much of this product finds its way to the large cities, New York and Philadelphia; much more than this to the cities, towns and seaside resorts within the State. Another portion is used at the creameries; cream only being extracted for butter and for ice cream purposes. In addition to this is the daily home-supply of all the families of our rural and village populations.

Placing the above amount of milk, 316,440,000 quarts, at a valuation of two cents per quart, gives $6,328,800, or an equivalent annual return per cow for all the cows of the State of $31.64. Progressive dairymen will at once say this return is not large enough for profitable work, and very many producers of milk are receiving a much higher return per cow annually. And, yet, when we remember that the *total* number of cows includes not only the largest milkers, but young cows and old ones as well, the estimate may be too high as it stands.

While the figures given are not absolutely correct because of the absence of full reports of prices received in the markets of the State, they are, nevertheless, approximations based on the most reliable data available, and will afford food for reflection by thoughtful owners of dairy cattle; the outcome of which should be that the annual product per head must be increased and the cost of maintenance decreased in every possible way if greater profits are to be expected.

This latter can be done by eliminating unprofitable cows from the dairy. To do this it will be necessary, as has been so often stated, to keep accurate account with each cow, both as to her cost of keep and her compensating product for the same. And in view of surrounding close competition, New Jersey dairymen will need to give these subjects most careful attention.

The matter of selling milk on its merits, rather than solely on quantity, is receiving more attention than hitherto. If the sale of

milk as to its character is to be regulated by law it would seem that the first insistment of the law should be for a pure and healthful article. Certain samples of milk may contain the present legal amount of solids and yet not be a healthful article; on the other hand, other samples may fall below the present standard and not be adulterated and yet be perfectly pure and wholesome.

Supposing such a system of dairy inspection to exist as will make periodical examinations of the dairies furnishing milk to a certain market, and a certificate of health of the animals and the cleanliness of all surroundings, and of the stables, milkers, utensils, &c., is furnished the dairymen by the proper official.

Two of these bring their milk to your door; one guarantees a higher per cent. of butter-fat than the other and he wants ten cents per quart for his milk. The other guarantees a lower per cent. of butter-fat than his neighbor, but will sell at six cents per quart. It is for you to say which you prefer; both are *equally pure and wholesome*, neither has been adulterated, but are just as they were taken from equally healthy cows. This seems fair.

The State is endeavoring to secure to its citizens pure food products. It does it. The consumer who is satisfied with a lower grade of milk, so far as it relates to butter-fat, gets it and at a lower price. The other prefers a higher per cent. of butter-fat, and he pays the difference in price and gets it. Both are satisfied. Both have purchased equally pure milk and the producer has been paid according to the value of the article he brought to the market.

But with the present system the man with the milk below a certain per cent. of butter-fat would be fined as selling adulterated milk, and he an honest man. Many of the creameries throughout the country are buying milk on the basis of the butter-fat content, and this has done more to eliminate the low per cent. cows than any other thing, and the same result might follow if this method of buying were general.

As to a general healthful milk-supply, it must be apparent, I think, to observing dairymen that health authorities in our cities and large towns are becoming more vigilant in this particular. Their insistment is for milk absolutely wholesome at all times; milk produced from healthly stock, pure food and cleanly conditions of stables, utensils and attendants. And milk producers who can guarantee the output of their dairies to be of this character will popularize their individual dairies and the business.

FARMERS' INSTITUTES.

Those in charge of the educational interests of our State have found the Teachers' Institute a fruitful means of improving both the teacher and his work. Lectures by capable, leading instructors before the teachers concerning the best plans of instruction and school government, with discussions of methods, conditions, requirements, means, &c., have produced greater system and harmony in the work and increased its efficiency.

This being so, other organizations whose stability and progress depend largely on increased intelligence have adopted similar means to secure it, and the Farmers' Institute, where rightly conducted, has proved to be of exceptional benefit in the broad field of agricultural thought and practice.

The best-known agricultural workers and scientists are required to present their discoveries in scientific investigation of the laws of plant and animal life; the food required by each for a given result; the diseases affecting either, and the cause of prevention or remedy, if such there be; the insect hordes that assail plant life with such destructive force, and the means of overcoming them, if that is possible, while the practical worker in the field contributes his experience and the results of his practice from year to year in agricultural, horticultural and stock matters.

Thus, annually the intelligent, progressive farmers of the State can, if they so desire, avail themselves of the best experience and knowledge possible to secure, and apply in their own practice. Where they have done so for any considerable time the effect is plainly visible to an intelligent observer. Indeed, the contrast is not confined to the farm, the crops and the management only; the improvement in the farmer himself, and frequently in his home and family, is also apparent.

Is this of any benefit to the State? Who can question or doubt it? That which increases the productions of the State, whether for home consumption or export, and whether produced in the field or the factory, adds that much to its income. And, surely, any consistent means that adds to the intelligence and self-respect of her citizens should be encouraged.

We believe, therefore, that the Legislature made no mistake when

it gave permission to the State Board of Agriculture to "employ lecturers before the Board at its annual or other meetings, and in the counties of the State as far as the sum appropriated would allow."

Last year there were held thirty Farmers' Institutes, with from three to five sessions each and touching all the counties but two; giving two and even three meetings to some of the larger counties. These, by order of the Executive Committee, were conducted by the Secretary of the Board. Halls, opera-houses and churches are utilized for meeting places, and the attendance and interest are very encouraging.

All questions connected with agricultural matters are considered as the localities may seem to require, but matters of a political character are never allowed. Another advantage of the Farmers' Institute in New Jersey is, it affords the opportunity by which our State Experiment Station workers can present the results of their work to the farmers throughout the entire State in person. This, in addition to the regular bulletins promulgated therefrom, is a great gain, and the work of our professors is thus utilized as it might not be without this arrangement.

On the 8th of November the course of institutes for the coming fall and winter will be opened and will embrace about thirty meetings.

THE STATE BOARD.

The regular annual meeting of the State Board is held at the State House the second week in January. Here the subjects presented are usually treated in a broader, fuller and more extended sense than is possible at the local meetings. This being a delegate body, as required by law, the representatives feel that it is the proper place to consider questions of general interest to the entire State as connected with agricultural matters.

An inspection of the programmes of previous meetings must convince the candid critic that it has been the aim of the Executive Committee to confine the addresses and discussions to the main questions of agriculture. What may be injected by discussion or introduced by resolution is not possible to anticipate, no more than is possible in any other deliberative body.

But, speaking from personal knowledge of the transactions of other State Boards of Agriculture, I am quite sure that the deliberations of the New Jersey Board are confined more closely to the main busi-

ness committed to it than are those of numerous other States. The annual report of the Board comprises for all purposes an edition of five thousand copies, which gives, after deducting those used in other directions, one copy to about every seven farmers. As an evidence of the value of its contents, I may say that this entire number, except about one hundred copies reserved for occasional calls, has been circulated and the demand continues.

COUNTY BOARDS OF AGRICULTURE.

These are organized according to law and are auxiliary to the State Board, and from them are sent two delegates annually as their representatives in the larger body. There are now nineteen of these county organizations holding meetings quarterly or semi-annually, as the case may be.

Their chief purpose is to keep in touch with the agricultural interests of the several counties with a view to the demands, development and progress of these interests, and their best development; reporting their condition annually to the State Board, and a summary of these reports is usually published in the annual report of the Board as required by law.

FREE MAIL DELIVERY.

One of the questions not bearing on practical agriculture and yet of great interest to all rural residents is that of free delivery and collection of mail matter. The fact of our dense rural population in most parts of our State, and also the increasing milage of good roads, are reasons for urging the extension of this service to our entire State.

And it is a satisfaction to know that the New Jersey Board has been a pioneer in urging this matter upon the attention of our Postmaster-Generals of former administrations and a still greater satisfaction to know that it is likely to become an established fact in the near future. When this is introduced it is reasonable to believe that residence in the country will be more attractive, not only to farmers, but literary men and others as well; and that the value of farms will be measurably increased thereby.

FARMERS' NATIONAL CONGRESS.

This is a voluntary organization of some years' standing, holding its annual meeting in different sections of the country, and claiming to be the chief organized representative body of farmers in the United States. Its discussions, deliberations and deliverances have some value as expressing the views of many intelligent farmers on the questions engaging their attention.

These are of wide range and varied character, and, in the main, are more or less intimately connected with the agricultural interests of the whole country. But there are questions of interest to certain localities not of equal or even any interest to those in others. These, when presented, occasion a diversity of debate and a divided vote, but they are usually referred to the locality interested to be settled.

The congress affords a tempting opportunity for the presentation of new schemes, and the radical politico-agriculturists attended this congress in large numbers this year, and they introduced their resolutions with fervor and advocated them with intense earnestness; but, in every case, as I remember, the final action of the congress, on all questions, was conservative.

All the delegates appointed by the Governor of New Jersey attended the meeting, and their part in committee, debate and vote was done in such a way as to reflect credit on the State they represented and on themselves as representative men.

Opportunity was given by the Great Northern railroad, through its President, Hon. James J. Hill, to inspect the vast wheat fields of the Dakotas. It being at the closing of the reaping and the beginning of the threshing season, the trip, which embraced three hundred and fifty miles of travel over different routes, was thoroughly and profitably enjoyed by all Eastern and Southern delegates, especially those who had not previously had a view of such vast areas devoted exclusively to the leading cereal product of our country.

President Hill made a highly instructive address before the congress on some of the great economic questions of general interest, especially on that of transportation and freight rates, and on possible means of extending the demand for our products in Asiatic countries.

Mr. Hill went into details showing the effort he is making to develop a great Asiatic market for the grain crop of the Pacific coast,

explaining that the surplus of coast wheat was the greatest factor at the present time in depressing the grain markets of Europe. In the last two years there has been a marked increase in the shipments of flour to Chinese ports, and if the matter is followed up with intelligent effort a great market can be secured. If the people of a single province of China can be induced to consume one ounce of flour per day per capita it will absorb the whole wheat crop of the Pacific coast.

Mr. Hill pointed out with special emphasis that the National Congress, in the last thirty years, had never enacted one single line of legislation with an intelligent purpose of increasing our foreign trade in agricultural products. He urged that a commission composed of intelligent, practical men be sent to China and Japan to investigate the possibility of opening up a market for our grain. He had at his own expense kept an expert there for a year, and the data thus secured convinced him that the way to permanently-paying wheat prices for American farmers lies through the ports of China and Japan.

Under present conditions the California wheat crop is put afloat between October and April, and the blackboards of Liverpool show during that time ten, twenty and twenty-five millions afloat in Europe.

The sentimental effect of the supplies is to cause buyers to hold off, secure in the belief that when the cargoes arrive they will be forced to sale even at falling prices. If this burden of California supplies can be distributed over the year, instead of being bunched in four months, or, better still, if it can be diverted to new markets, it will help every wheat-grower in the world.

The attendance at this congress was larger than at any previous one.

The year past, as compared with a few of those immediately preceding it, has been somewhat more encouraging to the farmers of the State. True, all crops have not been higher in price than formerly—some are lower; nor has the advance in price, except for wheat, been in connection with a full normal crop, for potatoes and apples were both short crops. But the advance both in yield and price of the great staple wheat, as stated in the fore part of this report, with a relative advance in some other crops, has given needed help for the present and a more hopeful expectation for profitable returns for future work.

With an increase of steady work in our manufactories, there will be a greater demand for farm produce. For it is a fact that laboring

men who receive good wages are free in expending it for the necessaries of life. They would and should live well. They are the farmers' best customers, and the effort should be more earnestly made to get the perishable produce of the farm to them in its best condition. The markets, whether it be the farmer's wagon, the huckster's cart or the middleman's stall, should be within their easy reach.

The elevation and improvement of agriculture depend upon the farmer. His resources must be found largely with himself, and economy in production over present methods will be found to be one way of increasing profits. There is room for this. And every branch of the industry pursued should be put under business management, with a view to economy of administration. This cannot be well done without keeping accounts.

Some of our farmers' boys are taking courses in business at our business colleges. Let them apply these principles on the farm. They will find a broad and interesting scope for such practice here, and withal they will discover the weak points of farm and stock management, and be able, possibly, to turn them to a profitable result.

Mr. Lewis—I notice the Secretary, in his report, refers to the average yield of wheat in this State as being a little in excess of 20 bushels per acre. I remember at one time, several years ago, the yield was less than 14 bushels, and in Ohio the average yield was 18 bushels, the highest yield at that time. For the last seven years my average yield has not been less than 27 bushels, and for the last three years it has been 34 bushels. If we can increase the yield in this ratio, why not all over the State?

I notice, also, that this corn on exhibition here is very fine. It is stated that it was planted as soiling corn, planted in rows three feet apart, and about eighteen inches in the row, and that this was allowed to mature, and yielded a crop of 127 bushels of shelled corn to the acre, and all this without special fertilizers.

The Secretary—It would be interesting to know how this was done, and we might call on some of our Salem county friends to tell us about it. You know they took the premium at the World's Fair for their corn.

Mr. Fitzga—I would like to hear the report of the gentleman who raised 127 bushels of corn to the acre. I have seen statements of

that kind before, and they are very misleading sometimes. I would not advise any man to plant corn with the expectation of securing such a crop as that, for such statements are misleading. We know that the land in New Jersey is not the kind which will produce 127 bushels of corn to the acre with the ordinary farming, even with special care and special manuring. It cannot be done very easily, although it might have been tried on a small plot of ground.

Prof. Voorhees—That supposition is all wrong, for this was done on a large field.

Mr. Fitzga—I would be glad to see it. When you tell me they got 127 bushels of corn as the average crop per acre, from a large field, it makes me feel very shaky. [Laughter.]

Prof. Voorhees—This is something to aim at for the future, for we know it can be done, and it is to the interest of every farmer to attempt to raise 127 bushels of corn to the acre if he can possibly do it.

Mr. Fitzga—The season may not suit another year, and they may try the same thing again, and not get 50 bushels to the acre.

Prof. Voorhees—The season is longer in Salem county than in northern New Jersey, and this may have some bearing on the question. This will also teach us to select our seed, perhaps, as well as to do the work of farming the corn.

The Chair—It might be well for some of us to spend five or six months down in Salem county, and learn how to raise corn. [Laughter.]

Mr. Dickinson—I am pretty well acquainted with the gentleman who raised this corn. He is a very good and a very careful farmer, and one who, I think, would not report anything but the truth. He has a good farm, and uses a great deal of fertilizer. I may say the season has been exceptional for corn, especially in Mr. Dubois' section. There are plenty of lands in Salem county not as good as his, and last summer I took our Secretary through some of the worst lands he ever saw. He acknowledged he did not know we had such poor lands. [Laughter.] Then, too, we have as good land as will be found anywhere, and I have been as far west as the Rocky Mountains, and as far north as Canada and I didn't have to go there either. [Laughter.] We have as good lands in Salem county as anywhere in the Union, and some as poor, almost, as the alkali lands of the West.

Mr. Collins—I understand this corn was planted as ensilage; what would have been the result if planted as an ordinary field crop?

Mr. Lewis—Can the Secretary tell us what the average increase would be in the yield of wheat, on a basis of 10 bushels per acre increase?

The Secretary—The wheat acreage of the State last year was 121,571. With an average increase of 10 bushels per acre the total increase would be 1,215,710 bushels. Quite a respectable showing.

Mr. Lewis—If it were possible to increase the wheat yield of the State from 20 bushels to 35 bushels per acre what an increase this would make in the wealth of farmers of the State, and I believe it is possible to do this everywhere in the State where wheat can be raised.

Mr. Roberts—One of my friends recently was telling me his troubles. He had 22 acres of corn planted, and he is a most reliable man. He had built a new corn-crib, or a pair of them, rather. He made them 5 feet wide and about 30 feet long, with a space between roofed over for a wagon-shed. He thought these would hold his corn all right, but the farmer sent him word he must have more crib-room; he told him to fill in above the wagon-shed part, but he sent word he must still have more room, so he sent a carpenter to build another crib the same size as the others. The carpenter stayed longer than he expected, and he found he had built a crib 5 feet wide and 60 feet long, and still the farmer asked for more crib-room. [Laughter.] So he sent the carpenter back and had another crib built 30 feet long, and in a few days the farmer sent word he must have more room yet, [laughter], and then he told his farmer to put the balance on the barn floors. He said his people said the crop was over 120 bushels to the acre, and this was the trouble he was telling me about. [Laughter.]

ANNUAL ADDRESS OF HON. D. D. DENISE, PRESIDENT OF THE BOARD.

Gentlemen of the State Board of Agriculture—Once more it becomes my duty to address you. Not from any aspirations of my own do I assume the responsible task, but from an established custom it seems to be expected that your President, no matter how incompetent he may be to prepare the manuscript, should have his annual address. And since you have again assigned the duty to me I shall endeavor to fulfill the mission to the best of my ability, hoping to have your kind indulgence and assistance in presiding at this twenty-fifth anniversary since the organization of the Board.

I trust that our mission at this session will be a renewal of the friendly interchange of ideas and experiences, and that we may be able to give as well as receive the thought that may prove a mutual benefit. We realize how closely the best interests of our government are allied with those of the agricultural interests generally, and we feel it is our duty, as intelligent people, to foster and encourage the tiller of the soil and the herdsman with his flocks.

We believe that in you and your calling are the elements of the success of ourselves, and of us as a nation. We believe that in your action and in your counsel you will encourage the farmer to a more thorough and a more scientific knowledge of his honorable vocation. The field of your labor is yet a broad one; it is responsible, it is exhaustless, and while you undoubtedly feel that you have much yet to learn, we doubt not that your words of wisdom will be lasting and beneficial.

In looking over your labors, covering a period of a quarter of a century, the time of the existence of this Board, we notice much of importance you have accomplished and much of good you have done. The benefit of your Board, the advantage it is to our most important department of labor, is apparent to the most casual observer at all times. This nineteenth century is a great and grand one. To live in this age is a great favor when compared with periods gone by.

The advancement made in the arts, sciences, discoveries and experiments is truly great and marvelous; the facilities and improvements, wonderful machinery, telegraphy and the whole world revolutionized by electricity, as seems to be indicated by experiments and discoveries,

and are we behind in agriculture and all that pertains to our calling? We say no, and on you and upon this Board much depends to keep apace with other things around us.

I am not here to boast, nor would my fellow-farmers bear me in much egotism, but it is due us to say that, while our State may not outrival and lead all other States in all improvements, advancements, experiments and success in the line of farming, horticulture, dairying and manufacturing, I may be allowed to say with some assurance that we are not entirely undistinguished as part of this great country of ours.

I had occasion to visit some of the so-called rich and fertile plains of the great West not many months since, and such a sight in the way of acreage in wheat fields I never dreamed of; it was far beyond my expectations. I would say to my brother farmer in New Jersey, don't be discouraged and want to go West, for our State has advantages that no other State has in the line of agriculture, and I am more convinced than ever that New Jersey is one of the best agricultural States in the Union.

In my travels over this State the past fifteen or twenty years I have learned two important things. The first is, that this is a great and a very good State; the second is, that the people do not know it—in other words, New Jersey is a much better State than the average citizen believes it to be.

We that are middle-aged or more know that we cannot farm now the same way we did thirty or forty years ago. Our soils have lost their native fertility. The time was when it was thought that most anyone could be a farmer. Now farming is reduced to a science, and that farmer that does not use science in his calling might as well quit the business, for he cannot succeed on the old lines.

Let us notice how some of our farmers manage: We step into their stables and find their cows giving from 2,000 to 3,000 pounds of milk per year, making from $20 to $25 per year, when we know it costs that to keep them, and sometimes more. This manner of farming will not pay, and it is no wonder we hear so many farmers saying of late years that farming doesn't pay. These things must be changed.

We cannot get large prices for our goods, but we must produce them at a less cost and in greater quantity. We must bring our farms up in fertility; we must bring our cows up in production of

milk to 5,000 and 7,000 pounds of milk per year. This can be done through breeding and handling and the manner of feeding them. All of these are brought about by progressive farming, and right here in this Board meeting is the place to learn it in disseminating of knowledge and interchange of thought.

One great hindrance to progress in our Board meetings and also in the Institute meetings is the timidity and backwardness of the farmers in advancement of ideas of practical importance. As a general thing, ideas expressed by practical farmers, though roughly spoken, carry more force and are more quickly grasped than when expressed from a theoretical standpoint. This timidity, I trust, will be overcome.

A FARMER'S EDUCATION.

I am sorry to say the prevailing idea, until within a few years past, was that farming is the occupation that calls for the least amount of knowledge; that the young man who could read and write and hold a plough was competent to run a farm; that time and money expended in sending the farm boy to school after he attained the age of twelve years was all loss, because his services at home were quite an item of gain.

Now, I do not think any of you reason thus, because, by your very presence at this Board meeting, you show that you have agricultural prosperity at heart. Don't think he has learned enough, perhaps, to read a newspaper and write a letter; but as for the work on the farm and its living facts, and laws of growth, he has learned nothing.

The time is coming, and not far distant, when the child will be educated to know, love and use nature.

Take the farmers' business, what does it require? As a gentleman said to me recently with great emphasis, "The knowledge of farming and the proper understanding of it is a case of one in a thousand; there is no other employment on this earth that involves so many of the sciences as agriculture." There is no branch of business to which a man can turn his mind that demands for its intelligent practice an understanding of every branch of learning as farming does.

The farmer makes a mistake when he says, I don't care to send my boys to college, they are going to be farmers and I reckon I can teach them farming better than any professor in the world. Very likely he can teach them the common process of farming on his own farm, but

ask him to explain the constitution of the soil on the farm, and he will ask you what you mean. Ask him to describe to you the laws of its growth and development and the way in which it can be nourished by giving it plant-food in the form of fertilizers, and he may say he knows it can be done, but doesn't know how.

Go where you will, in any civilized country, and you will find that to-day agriculture is under depression; not so bad in our own country at present as a few years past. All over the world this food industry has engaged so large a portion of the work of the world that it has run itself into the ground. What can be done for the agriculture of our country? What must be done to save it from the condition into which it is falling?

Times have changed and we must learn to change with them. What we want on the farm is brain power—brain power brought out by education or brain power that is well equipped with a knowledge of the facts, the forces and the sciences that will solve the problems of the farm. It also demands business knowledge to make the farm successful. I never knew a good business man to go on a farm with his business qualifications and make a failure of it.

Another question is, How shall we keep our farmers' boys on the farm? Our rural population is drifting more and more to the cities. What is the trouble? The farmers say the boys get bewitched after the shows and enchantments of the city. I don't blame them. Who would live in the country, where there is so little society, where the opportunities and enjoyments are so few, where the intellectual life is so slow and small, and where all that elevates and adorns life is so wanting, when in the city all these advantages can be had?

The question is, Can we change this drift? Can we make the farm so attractive to the farmers' sons and daughters that they will come back to the country? I hardly dare say what I think, so many would contradict it; but you know as well as I that a great many farmers do not make their homes as charming and as comfortable as they should be or as they could if they so desired. The men I mean are not here; they do not attend agricultural meetings of any kind. They simply toil and slave all the time to save, and leave their homes destitute of all that makes life a pleasure.

I would transform the farm-house and make it as cozy and comfortable as any city house, as cheery and as bright. I would surround it with trees, and lawn, and flowers, and varieties of fruits. I would

fill it with books, new and old—books most tempting and instructive. I would make this home a gathering place for friends, and your sons and daughters will not want to leave such a home.

In closing this subject I want to leave with you this thought—that true education is lifelong. There is not an hour, so long as there is life, that a man cannot learn something new and be the stronger for learning it. There will never be an hour when there will not be more truth to learn, Let it be understood that no man's education is worth really what it costs if it ends with his school days. Let our farmers, above all others, know all this and use it.

SOME FARM ECONOMIES.

In all kinds of business the profits are in proportion to the relation that can be maintained between the money received for the products and the cost of production. The farmer is prospering when he sells his crops for more than it costs to make them, and at the same time, year by year, adds to the actual value of his farm by increasing its productiveness and multiplying its facilities.

He is on the road to success who can from his farm maintain a family in comfort and have something always left after paying his obligations for investment in permanent improvements. For some years past this has been found by many a difficult thing to accomplish. By economy I do not mean mere saving, for that is not always economy; but the spending of your money in your business so that it produces an increasing return and leaves a profit on the investment.

What a farmer now most needs to study is how to produce more from the same amount of land without materially increasing the cost. But it will not pay to cultivate poor soil, for in the best seasons you only get paid for your labor, and in a poor season you receive only half pay. In the first instance there will be no profit, and in the last much actual loss.

All the farmers that I have known to be successful have not only labored to produce the greatest amounts from their farms this year, but to have the ground in a condition to produce a still greater amount the next year, and the year after, and so on. Many leave their farms in such a condition as to produce less and less each year. What is the difference between a farmer on one side of the fence that

raises two tons of hay to the acre, and the farmer on the other side that raises only one ton? A little more fertilizer applied to his wheat, a little more thorough cultivation, a little more attention to sowing his grass seed, and a little more wit about pasturing.

I wish to call particular attention to this pasturing mowing ground. In my travels over the State the past two months I have frequently seen the stock pasturing on the mowing fields until the grass is eaten to the roots and the ground packed hard by tramping on it. You need not expect to get a crop of hay if you continue this kind of practice. You are injuring your stock, the same time destroying your future hay crop.

It has occurred to me that our farmers can, by exercising economy in certain lines of their work, decrease their outlay and thereby have a healthy net profit from the farm, although the prices of produce may be low and the times hard. The farm is to be regarded as the capital of the farmer, which is invested at its best when every acre is producing the most valuable crop in the greatest quantity of which it is capable and at the least possible cost.

The continual talk with many farmers that farming doesn't pay is due to the careless and indifferent way in which they farm. The Creator did not make the world to be farmed the way many do, for the first occupation he gave to man was to dress the garden. It is painful to see the waste which annually takes place on the farms from the neglect of machinery and implements. When not in use they are left out in the weather to rust and warp, thus becoming more liable to break. The durability of an ordinary farm implement is more than doubled by being properly cared for.

Furthermore, with implements always in order the farmer is not so liable to be subjected to annoying and costly delays in harvesting and housing his crops. Next to the proper care of farm machinery is an economy to have the most improved machinery upon our farms. It is economy to have good horses and mules to do the work—in fact it is necessary to have everything connected with the business first-class.

In saving and applying manures there is a great opportunity for the exercise of economy. How few of us pay attention enough to the collection and preservation of fertilizing materials, and then to the time and method of applying them so as to get the best results. Those of you who have heard Prof. Voorhees talk on "How to Save

and Use Farm Manures" can readily see the mistakes we make; but how few of us practice as well as we know!

It is a source of great loss to many, and in fact most farmers, in the way they purchase their commercial fertilizers, which is a great outlay on the farm. Much money, in my opinion, is lost every year in this State by the persistent cultivation of worn-out land. It is far better to break one-half the quantity of land and concentrate the manure and fertilizer and the labor than to plow a vast field and after the year's work is done to reap a scant harvest of one-half the proper yield.

MARKETING FARM CROPS.

How to prepare and market the crop to the best possible advantage, so as to realize a profit, and to establish a market for future dealing, must be pursued on business principles. Quite as much importance attaches to the marketing of produce as to the raising of it. Many farmers are heavy losers by not marketing their crops at the proper time and in the proper condition.

It pays to clean grain so as to offer for sale only the best quality; the refuse can generally be more profitably fed to stock at home than to cause loss in price by lowering the grade of that which is sold. This is true to a still greater extent in the marketing of fruits and vegetables. The proper grading, handling and marketing in attractive packages of the large and small fruits can scarcely be overestimated.

Honesty should constitute the general principle to be observed in packing farm products. There is probably no business to which the adage "honesty is the best policy" so aptly applies; and I am sorry to say it, but it seems as though there were no legitimate business in which it is so often disregarded. Some claim that the facing of packages of fruit and vegetables is deception. That depends on the manner in which it is done.

Facing should be properly done in order to make the package look attractive but not to deceive. The reputation of the farmer has much to do with the profitable sale for his goods. This is true in all departments of the farm, but none more so than in the dairy. Some persons sell their butter at prices far in advance of the market because of their reputation, while the butter may not be an iota better than that of some other persons, close by, who accept market price.

The difference is, one is uniformly good and has a reputation, while the other is occasionally poor and has no reputation. The farmer who always grades his farm products and puts his name on his best grades as manufacturers do, is practicing business methods from which he may hope to derive a profit.

The stock-raiser who sends out nothing but the best stock for breeding purposes and sends the rest to the shambles, is practicing correct business habits. I must give further emphasis to the importance of integrity to the farmer. He must have a good reputation. He must be honest in his dealings; as a matter of business he must be a man of integrity. His goods must be as represented or he must pay the penalty of the deception. His good reputation is largely his bank, and it behooves him to take care of it.

The honesty and integrity of the American farmer are the strongest safeguard of our country as a nation. Someone has beautifully said: "If you would enjoy a long, peaceful, happy life; one comparatively free from petty annoyances, and one in which you will find most leisure for mental and social improvement, and one in which you can enjoy your evenings with your family, I would advise you to stick to your farms; remembering that success in life does not depend alone on the amount of money we accumulate but upon the amount of development we can bring to ourselves, and the good we can do to others."

Prof. Voorhees, in the chair—This is an exceedingly practical address, bristling with good suggestions, and it needs your careful consideration.

POULTRY AND EGG PRODUCTION.

BY J. E. RICE, ESQ.

POULTRY AND EGG PRODUCTION.

Mr. Chairman and Gentlemen—I am more than glad to be able to talk to you about poultry and egg production, because I realize you are in what should be known as the egg belt, for your climate is adapted to the business. Of course, eggs are raised and poultry is raised in large quantities away up on Lake Champlain, and day before yesterday I came from a country where we traveled in sleighs, over three feet of snow, and where the temperature once in a while drops away down to 30 degrees below zero. They are in the frozen egg belt. [Laughter.] I have also been south of you, and I am quite well satisfied that they are not as well adapted to successful poultry-raising as you are. New Jersey and Pennsylvania are the ideal grounds for poultry-raising.

In looking over the ground for profitable poultry-raising, the market must be studied. A few years ago the best method was raising winter broilers, for they could be sold at fabulous prices, but the cold-storage man has changed all that, for he takes the broilers and puts them in cold storage and freezes them when they are away down in price in the summer season. He keeps them frozen solid until the winter season, when the price goes up, and finally sells them at prices far below what they can be raised for by artificial means, and if he cannot sell them one winter he may even keep them frozen until the next winter. [Laughter.] There is not as much money to be made as formerly in the winter production of chickens. One or two litters may be raised in the month of May, and fairly profitable prices may be secured. Recently a new branch has opened up, in the production of chickens in the fall. They can be grown more cheaply in the fall than in the spring, because, for one thing, eggs are not so high in price, and the eggs are more likely to be fertile, and this is an important thing. Then we have the warm weather for them while they are small. These can be marketed for from eighteen to twenty cents

per pound. This is a growing industry, and people buy them readily when they realize they can get these fresh chickens, and pay more for them, in preference to those from the cold storage.

Once New Jersey was famous for its capons, but this seems to have gone out. Another branch of the business is the raising of fancy fowls for exhibition at fairs and for sale. This is not within the province of the ordinary grower, for the grower of fancy fowls must be an enthusiast. He must breed for points, and exhibit his fowls at the various fairs, advertise largely, and make his money out of the fancy breeds. The average farmer has too many other things to do to make a success of this branch of the business.

There is one branch of the business with money in it, and that is the production of eggs for fall and winter markets, when they bring two or three times as much as ordinarily, for there is no farm product that will find such a ready sale, at such a good premium on the cost of production, as freshly-laid eggs, during the fall and winter seasons, when they are ordinarily scarce. In the spring the conditions are all favorable, and all the hens are responding, and the eggs are run into the markets by the bushel basketful. Some say they only obey nature's law in all laying at the same season. Nothing of the kind. All the hens lay then because it is popular. [Laughter.] It is a difficult matter to make hens lay in the fall and winter, and without this you cannot get profitable eggs. You cannot make them artificially, and they cannot be adulterated. There will always be a demand for freshly-laid eggs, and there is but one way to produce them and that is by the hen.

People can buy artificial butter, and they can buy buckwheat hulls for pepper, and various other forms of adulterants for other kinds of foods, but the fresh egg cannot be adulterated, and there will always be a steady demand in the fall and winter for newly-laid eggs at good prices. With the ordinary egg you are never able to tell, until broken, what it is like, and then it is too late to "kick." If people know where to get fresh eggs they are willing to pay more for them than the ordinary kinds, and therein is the profit. But enough of this. How will you make hens lay when they won't? Therein is the difficulty. Now, don't go away from this meeting and say you heard the man say you must feed a certain kind of feed to the hens, and that they then must lay. It is difficult to make them lay when every law of nature rebels

against it, and if this were not so every one would be doing it. So much by way of introduction.

So far as my understanding of the question goes, I could say in a few words what I have to say, and you would have the whole secret of success along this line: have the right kind of fowls. Some fowls never can lay to any great extent. Have fowls, so far as possible, that have been hatched in April and May, for these early spring fowls are the best egg-producers. Give them all the warm, nutritious food they can eat, and don't be afraid they will get too fat. Keep them in a warm, dry and cheerful poultry-house, and make them hustle for what they get. That is the whole thing. Let us get this right down to the plan of keeping 100 or 200 hens, for that is about the number we have. We carry 200 Leghorns, and we keep them in a warm, dry house; there is no factor more important than this of warmth in egg-production, for if they are not kept warm they will not respond. The great difference between the fall and spring is that of temperature, so you must provide them with a warm building.

Now, as to the location of the building. I have noticed in many instances that farmers pay no attention to the location of their houses, and oftentimes a fatal mistake is made in this. They build the house on an eastern or northern slope, and the house faces probably the wrong way. It is often located in an exposed position, where the wind blows right over it. The house should always face the south, if possible, and if sheltered by a hill or other buildings, all the better. The house must have the sunshine, and must be sheltered, and it will be from five to ten degrees warmer than if exposed and facing the wrong way.

As to the building itself, many people waste a lot of money in starting. It is not wise to invest a lot of money in a big poultry-house right at the start. It is often the case that this sort of thing runs right through a community, and it is the mistake generally made to start out with an expensive house, and to spend a lot of money foolishly. I believe this thing strikes every community once, at least. They figure they can make a dollar a hen on their stock, and they say 1,000 hens will net a profit of $1,000, and it is just the thing, and every man who makes a failure as a lawyer, or as a merchant, goes into the hen business, with the idea that he will make a fortune right away, and that is why there are so many failures in the poultry business. This is all wrong. If you want to go into the

poultry business you want to start in with your old house and your old hens, and when they begin to pay build a little better house, and get better hens, if you need them. They will do just as well in the old house, probably, if it is warm, and dry, and light, and cheerful, and you can make just as much money on them as if they were housed in a building costing $150 or more. Don't let the hens get proud by putting them into too fine a house. I know one man whose house has cost him from $1.50 to $2 a hen, and he has no eggs either. Begin with what you have, and see whether you can do anything first.

If you build a new house, there are several things to consider, and I have here a plan or draught of a house, which will illustrate my ideal of a poultry house. I will explain some of its advantages to you, and it remains to be seen whether you will agree with me. Of course, we are all obliged to make so many mistakes in our lives, but here is the plan. We build this house as long as necessary to hold the stock, and we build it 15 feet wide, because it takes less material proportionately than when built 12 feet wide, for to gain the extra three feet in width it is only necessary to push one side out that much, and you add to the roof and to the two ends only. As to the slope or pitch of the roof, I prefer one slope only, because it takes less labor and less lumber, and it is easier to build. A building 15 feet wide takes a 16-foot rafter, and the only cutting required is at the ends. I prefer a tarred roof, although it will not last forever, but it is extremely cheap, it is absolutely tight, and it *must be tight.* Then we can ventilate it, and secure pure air, which is of the utmost importance. Warmth of the house and pure air are two of the most important considerations in a poultry-house, and really the value of a poultry-house is measured by the coldest days of winter. Tar paper is also the cheapest roof that can be put on, and if the roof slopes toward the north it will last a long while—longer than if sloped toward the south or partly both ways. We have found where the roof slopes both ways that the paper on the northern exposure is quite good when that on the south is all gone. Then, too, if the roof slopes toward the south, it makes the house very hot in summer, as the black color draws the heat rays.

With the roof sloping toward the south we get a high, vertical front, 9 feet in front, and 5 feet high at the back. This enables us to put the windows in the southern exposure and near the top. And

why near the top? This is extremely important; it is a great mistake to put the windows low down. With the front 9 feet high, the window will come within a foot of the top, and when the sun is away down, in December, the sunlight can shine clear back and make the hens lay. When sunshine is worth dollars and cents to us, we want to pour it right into the hen-house, and with this arrangement the sun will shine clear back the full width of 15 feet and strike the floor every time. If the windows are too low down the sun will not shine far enough in, and the house is practically in darkness much of the day.

We can also make the mistake of having too much glass, for with too much glass it will be too cold at night, as well as too hot in the daytime. The glass radiates the heat very rapidly at night, so do not have too much of it.

Now, as to the floor. I have never seen an entirely successful poultry-house (although I presume they exist) without either a board or cement floor. Personally I prefer a cement floor, because it is cheapest. It is more satisfactory in every way, and it is absolutely dry. It must be covered with sawdust or straw, otherwise it will be extremely cold. The same may be said of boards; they should be covered with sawdust or straw, for cleanliness and warmth. This will catch the droppings, and the floors can be readily cleaned. Then I would have a foundation under the house, too, as this will help keep it warm.

As to the sides of the house: It is a fatal mistake to build them as they are frequently built, as they are neither warm nor dry, and if there are any successful poultrymen here they will agree with me that it is a fatal mistake to have a wet poultry-house, because the hens will either have the roup or they will suffer with the cold. Better have the windows wide open and have the house comparatively cold than have a wet, half-cold atmosphere. Have it dry, by all means. This result can be secured very largely by the method of building the house on the sides. If you build the sides of solid material, all of one solid thickness, or of more than one thickness, close together, the cold is radiated right through the sides of the house, and it is as cold on the inside of the walls as it is outside, except as it is warmed by the heat from the hens. This bodily heat comes against the cold surface, the heat is taken right out of it and the moisture condenses, and if the weather is cold frost will form on the inside of the house. First you must have a tight outside surface

of weatherboards, then the studding inside of that, then a thickness of heavy paper, and then a thickness of vertical, matched boarding, and then a thickness of thin, matched boarding on the rafters, and then stuff with straw between the studding and between the rafters, and you will find you have gone a long way toward having a warm and dry house for your hens. If you don't believe it, try it yourselves and see. This is the most economical method, as it is not necessary to get the most expensive materials. You can buy inch stuff and have it ripped for about one dollar a thousand feet, and you are getting an extra thousand feet of lumber for this one dollar.

Then always whitewash your poultry-house; this is a small thing, but it is very important, and you here in New Jersey seem to have realized this, for the poultry-houses we see are mostly whitewashed, but you can travel for days over New York State and not find a building whitewashed. Down here we see it everywhere, and it is a splendid thing, as it keeps the poultry-house pure and clean, and it keeps down the lice. It also makes the house lighter, and if not familiar with this result it is surprising to find what a difference there is between the house before and after it is whitewashed.

We have pursued this method with our houses the last two or three years with but little modification, and it has given us universal satisfaction.

Now, as to the raising of the chickens. They must have a strong individuality, and they must be fed proper food. It must be a food that is easily digested. The idea that we cannot raise them except on a corn-meal diet has been exploded, and when you attempt it for profit it will certainly be a failure. They will not make the growth they would if properly fed.

First, use rolled oats with some kind of grinding materials. Where they are allowed to run at large this does not make so much difference, but where chickens are raised artificially something in the way of a grinder is absolutely necessary. Cracked oyster shells are an excellent thing and will be found inexpensive. Give them bread and milk, too, for the first few days. After two or three days feed on a custard made of the infertile eggs saved in testing out of the incubators. You can candle the eggs in the incubator after six or seven days, when the infertile eggs will simply be addled. These can be kept in a cool place and fed to the little chicks. Break two or three of these eggs into about a quart of milk and make a custard

for them. Thoroughly beat the eggs with a beater and put in the oven until it coagulates, and this is the mixture. Then, another thing, which I consider of the utmost importance: put in finely-chopped onion tops. This I consider most important, as the onions have peculiar qualities; we feed a great many of these finely-chopped onions to our chickens. Then give them johnny-cake; you know how it is made, out of buttermilk, fine corn meal and soda; put it in the oven and bake it thoroughly, then crumble it into the custard, and feed two or three times a day.

Cracked wheat is also an excellent food, the best of the grains I know of. There are certain kinds of grains the hens don't like, and there are others they do like especially well. One of those they do not like is rye, and they won't do well on it. They don't like cotton-seed meal. I have tried to make them eat it, but they won't take to it. The chickens are fed on cracked wheat, cracked corn, the custard I have described, and more or less rolled oats, until they are well along, and then they are fed the same as the hens. I will mention their feed later on.

There is no danger of feeding too much if they are fed the right kind of food. Corn meal is an unbalanced ration, and hens should not be fed too much of it or they will get too fat. They should have oil meal, animal meal, wheat bran, and various kinds of vegetables. You can make them eat all they want and they won't get too fat, if fed right. Good clover hay is an excellent thing for them. The man who succeeds in getting the most food of the proper kind into his hens is the man who will get the best results from his poultry-raising.

A man complained to me that he had been getting lots of eggs and then the hens stopped laying, and he had not been getting any eggs since. I went to look at his flocks, and I was about ready to give it up, because there did not seem to be anything wrong with the conditions. I asked him to bring me a measure of feed. I asked him if he had fed them for dinner. I took hold of one of them and it did not weigh anything like as much as it should for a fowl of its size. Those fowls were not half fed; they were literally half starved.

Pour the feed into them if you expect good results in egg-production. Give it to them in the right shape and of the right kind, and you are bound to succeed under proper conditions. They don't like dry food; they want it sticky. They want it so it will hang together. She wants the feed to go down like an oyster—in a lump, but the

lump must be soft and just wet enough to hold together nicely while she is eating it.

Professor Voorhees will talk to you later about the balancing of these rations, and a man must always consider these things. The grower can tell these things very much himself if he will notice carefully. Take hold of the hen and see if she is too heavy; if she is, leave out some of the corn meal; if she is too light, give her more fat-forming food. A poor hen never will lay, and a fat hen can't lay. The successful man is not necessarily the man who knows what to feed but how much to feed. You can hunt the country over and may not find a man who knows just when a hen is fed right. She must have nothing left over, but she must have all she can eat. If she is fed too much, and has some of it left over, she gets off her appetite. The man who knows how is the man who can tell whether his hens are hungry or not, and measure their feed accordingly. The man who says a Plymouth Rock hen needs a quarter-pound of feed don't know what he is talking about. Give her just what she needs, and no more, no less.

We like ground or rolled oats, as this is one of the best kinds of food for them. It is the speed of the racehorse, and the egg of the hen. We also like mixed feed for them in proper quantities. The ration we like best is 100 pounds each of corn meal, rolled oats and wheat bran. Fifty pounds of oil meal, the old-process meal, the flaxseed meal—the oil-cake meal. We feed this as a condition powder, because it is cheaper than the condition powders usually bought by the paper. The hens like it if you feed it right. It is a laxative food and will not hurt them. Then fifty pounds of animal meal; I will tell you what this is. We use the Bowker & Bradley or the Smith & Romain. It is a slaughter-house refuse, and comes 100 pounds in a bag. There is no food of so much importance, all things considered, as meat in some form. Fresh meat is better than the animal meal, but it is pretty expensive. We have one of the best bone-cutters made, and our experience is that the hens will eat the cut bone faster than we can cut it. If you see a picture in the papers showing a little girl running one of these bone-cutters, you can put it down as being all wrong; it takes a man weighing 175 pounds to do it, and it will make him sweat. [Laughter.] You can ask some of these people where they have their bone-cutter, and they will tell you it is on the barn floor, where it has been since last summer.

[Laughter.] I want to say, however, the bone-cutters will do all they claim for them. They will cut the bone up fine, and do nice work, but it will be found to be pretty expensive. We used one until we stuck a two-horse tread-power with it and then we thought it time to stop, and I traded the cutter off to a farmer for thirty hens. He had 200, and you can be sure I got the layers, too. [Laughter.] He ran the bone mill by water-power, and although all he had to do was to turn the water on when he wanted to run the cutter, he soon found it was too much trouble, and stopped using it. We use the prepared animal meal, as being less expensive. With the bones, when the first man gets a bone-cutter you can get the bones for nothing, and then your neighbor gets a bone-cutter, and you will be obliged to pay for them, until finally, as more cutters come into use, you will be obliged to pay as much as two cents a pound for them. If you can buy a horse for $3 its carcass will be worth $10 to the hens. It may seem a high figure, but it is a profitable investment for the hens.

Now, we have talked about feeding the hens, but there is something else equally important—we must make them work. Feed them morning and night with some kind of whole grain. They want a portion of their food ground, but some of it should be fed whole, and they will not do their best unless a portion of it is fed unground. We feed this to them morning and night. For several years we used to think they needed some stimulating food in the morning, but we have learned better. Why? You will notice if you feed them this kind of food in the morning they will stand around and wonder what is coming next. [Laughter.] That won't do at all; the happy hen is the hustling hen, and the man who makes her hustle is the man who succeeds. Make them work until 9 or 10 o'clock. About 11 or 12 o'clock give them mixed feed, but in the morning give them unground feed, right on the floor in the straw, and let them scratch for it. Give them all the feed they will eat up clean. At night give them the same as in the morning—say corn, oats or buckwheat and, if you can spare it, give them wheat once in a while. We have not felt that we could afford to feed much wheat when it is bringing $1 a bushel, but at 75 cents a bushel we have been feeding it. We have let them go without wheat this winter on this account.

We have also said you should feed them vegetables. These they should have regularly, and plenty of them. The hen is just like a growing boy; he will eat apples at all hours of the day or night, and

is healthier and hungrier for it, simply because the apples are an appetizer. The hen needs these appetizers in the form of vegetable food, and it never hurts her. If you have fifty hens, give them a bushel at a time. Don't cut them up; the hen will grab a piece and drop it and go for another and waste the first. Throw in the whole vegetable, and they will pick them out clean. Give them plenty of water to drink. We used to water our hens—of course we did; we used to give them some water in an old tin pan or anything that was handy. The hens jumped into it and tipped it over, and that was all the water they got. They want water when they want it, and they should have it at all times. They want it frequently, for a hen cannot fill up on water like a cow. They want a little water at a time, particularly to moisten their food. Put the water where it can be kept clean and nice. Personally I prefer the ordinary shallow milk-pan to the fountains, for it can be easily cleaned, and if it freezes in winter you can turn the pan over and the ice drops out without any trouble and it doesn't burst the pan.

In regard to vegetables, we find the sugar beets the best, and as I have said, we throw these in to the hens whole, about a bushel of beets to fifty hens.

Then don't forget to give them lime as well as grinding material. They must have lime in some form. If the hens are kept confined to the poultry-house for two or three months without lime they will begin to lay soft-shelled eggs, but if you give them lime in some form it will only be a short time before they will begin to lay hard-shelled eggs again. We must not overlook these things if we want eggs from our hens.

A word in regard to the breeds of fowls. If we want them as egg-producers, the Leghorn, the Hamburg and the Minorca cannot be beaten, but if you want an all-around fowl, to lay eggs, raise chickens and to be used for eating purposes, the old-fashioned Barred Plymouth Rock has never been beaten, although the White Wyandotte is nearly as good. You can depend on the Leghorn for an egg-layer every time, but if you want to raise chickens you can't trust her forty-eight hours. Of course, if you use the incubator and brooder, this is not an important matter, but it is a question of how many you want to raise. If you want a brood of 500 or 600, the incubator and brooder are best, but for 50 or 100 the good old way is the best. Of course, the incubator must be looked after

closely, while the old hen, if the right kind, will do the work nicely for small broods. It is just as much trouble to raise a few as a large number with the incubator.

If you want a fowl for egg production, pure and simple, there is more money in a Leghorn or Minorca than any other kind. Make her lay all you can, and you can afford to throw her carcass away. It only makes a difference of a dozen or so of eggs to enable you to do this. We want a hen that is good and strong and healthy, and, for an all-around hen, I know of none better than the American Plymouth Rock. The White Wyandottes come close to her, and they have a white plumage, and in preparing for market it is not necessary to thumb out the pin-feathers so closely. They are also quicker to mature than the Plymouth Rocks.

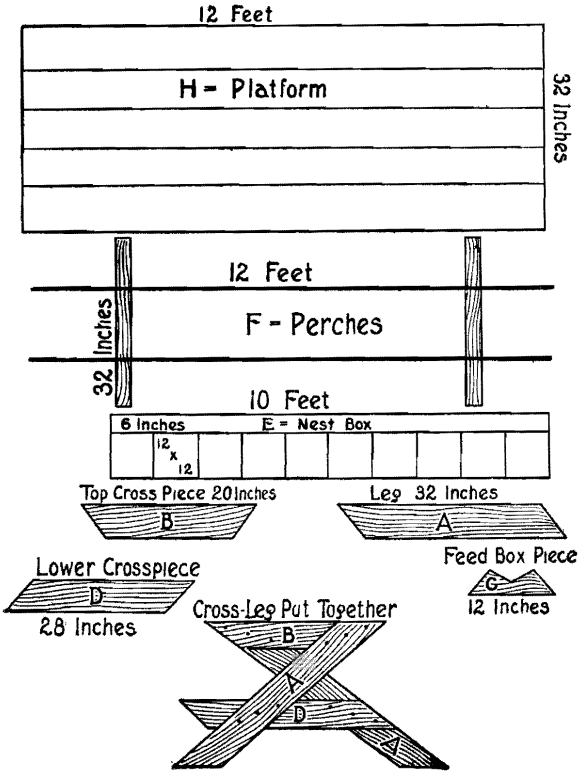
It is not wise, ordinarily, to invest in thoroughbred poultry right away, until the grower is thoroughly acquainted with the best conditions necessary for successful poultry-raising. You pay $2 or $3 for a setting of thoroughbred eggs, and the express company will break one, and the hen will break one, and some of the eggs will be barren, and when they are hatched one of them will fall into the swill barrel, and by the time you get them through if you have four or five thoroughbred chicks you will be fortunate; and then you may find that most of them are roosters, or you can consider yourselves lucky.

I believe it a good bit wiser to begin with your own old hens; pick out the best, and get a thoroughbred rooster, and raise your own stock, and you will get better egg-producers and for less money than any other way.

You may ask how you can pick out a laying hen. Examine her closely and study her carefully. If there is any man who has enough of hen intuition in him to go among his hens and study their make-up, he will get acquainted with them, and he will know how to tell which are the laying hens and which are not. That is why a woman succeeds so well. She will strike in just the right way and make a success of it, and the man who studies his hens and gets acquainted with them is the man who succeeds every time.

Take hold of the hen, feel her ribs, examine her carefully. All hens are not hens, so to speak. Your laying hen has a bright red comb, is active and intelligent; she must be deep from the back down to the keel, built for egg-laying, and not this little dudine of a hen

with no body. Pick out ten or a dozen of such hens and put them in a pen by themselves, tie a string on their feet, or mark them somehow, get a good Leghorn or Plymouth Rock rooster, and you will soon have high-grade fowls and as good egg-producers as you could probably get without much greater expense. Now don't go away and say I said it was not wise to have thoroughbreds, because you can make more money out of them every time. I am simply telling you how best to begin without expending so much money at the start. Stick by your old hens, selected as I have told you, and learn how to make money out of them first. Begin just where you are until you learn how to take care of them properly, and then get thoroughbred fowls and make more money out of them. Get Leghorns, Minorcas, Plymouth Rocks, Buff Cochins, and feed them the best you know how until you see how to get the best results in egg production. You cannot feed them all alike, for what will make the Leghorn do her



best will make the Plymouth Rock or Brahma die of apoplexy. Whatever breed you get you must learn how to take care of them.

I want now to speak somewhat of the interior arrangement of the poultry-house. I have a model of the nesting arrangement we use, and you are privileged to examine it if you wish. We are using this in our own houses and have found it very satisfactory. The nesting arrangement is the only thing we have in the poultry-house, and it should stand in the end so you can walk all around it. It is made so the hens can go into it, under it, or on top of it. We make it in the form of a table, 10 feet long and 18 inches wide, and 18 inches high from the floor. It stands on cross-legs like a saw-horse, because it is not so easy to tip over. The legs are each 32 inches long, and are put together at an angle of 45 degrees. On top of this table is placed the nesting-box. There is an alleyway 6 inches wide along in front, and the nesting-boxes are just 12 inches square and one foot deep. The hens can hop up the 18 inches and go into the nesting arrangement, or on top of the nesting-boxes on the platform which is placed over the boxes. This platform forms a cover over the nests, and also makes the nests dark, and they have the idea they are hiding their nests. This may seem a small matter, but hens are particular where they lay, and they don't like to lay out in the open. We have therefore made a dark place and fooled them; it is almost dark, for all the light must come from the small hole. You might ask why the nests were made 12 inches deep instead of 6 inches. Hens like to lay in the same place, although there are ten places to lay in, and some will have no eggs in them, and others will be chuck full. The idea is that if there is a hen on the nest and another wants to come on the same nest the egg is likely to be broken, but this way the first hen on, if she is a small one, can slip over to the next box and let the big newcomer have her nest, and there is no trouble about it at all.

On top of the nests or platform there are two perches, 14 inches apart and 4 inches above the platform. You may think it should be higher, but there is no reason why it should be. The platform catches the droppings from the fowls while roosting. In the winter two-thirds of the manure will be dropped on this platform, as against one-third on the floor of the house. If you have the perches as ordinarily built, on an incline on one side, one higher than the other, the fowls will push to get on the highest perch, because they always want to get to the highest perch. Then, too, the droppings all fall to the

floor, while with this arrangement most of the manure falls on the platform, and the floor is not fouled so quickly. With this arrangement, too, the hens have plenty of room, and they do not crowd each other and injure each other internally or externally. The whole arrangement is only 30 inches high, and there is no great distance to fall if pushed off the perches by the stronger fowls. The platform will catch the droppings, and should be made of matched boards, to prevent the manure from going through and fouling the nests. You can lift the platform up and scrape the manure off into a basket and carry it away. Have plenty of absorbent around—buy South Carolina rock plaster, for it is almost as cheap as land plaster, and it makes the best absorbent. It is worth all it costs for plant-food, and is just as good as the land plaster. We use it in all our stables, and in the hen-house, as well. It keeps the ammonia from escaping and it keeps stables and hen-houses sweet.

The house should be kept as clean as possible, as we want the hens to work in the straw to get the grain, and they will not work if the floor is not kept clean of the manure.

Under the edge of the nest there is placed a small V-shaped trough for the feed. It slides on a cross-piece up under the edge. The hens can eat out of it readily, but they can't get into it. On the other side is a shelf on two cleats, and on this shelf we put pans with milk and water in them, so that the hens can get at them whenever they want to. Originally we had two feed-troughs, one on each side, but one was found to be sufficient, and now we put the pans there instead. By this means we can keep the feed and drink clean, so the chickens cannot get in it or upset it or foul it.

Now, in regard to the lice. This is the best thing of the whole arrangement. The fact is, there are two classes of poultry lice; one is a mite. They suck the blood of the fowls at night, and then hide in the first place they can find. They are red in the morning and black at night, because in the morning they are full of blood. They get under the perches, that being the nearest hiding-place, and during the day you can kill them all. Put a little whitewash or kerosene oil on them, and that settles them. They won't go down in the nests because they want to be as near the hens as they can hide, and you can get them all by turning the perches over.

One point more—the gathering of the eggs. The first we made we had to let the lid drop down for each nest, but life is too short.

Throw up the lid above the nests—and there is a little cleat to hold it up until you are through—and then you can see all the eggs at once. If you have never had an arrangement of this kind you cannot appreciate how much time is saved in gathering the eggs.

You know how we all gathered the eggs in our boyhood days—and we did not gather them every day, either. It was too much trouble to gather them every day, and we only gathered them when we wanted groceries, or for dinner, and then we would hunt under the bushes, and in the wood-pile, and under the hog-pen, in the old soap-box, on the barn floor—and lots of places there were. There was the hole where the cat goes for mice in back of the hay-mow, and there is where the hens used to like to hide their nests. Maybe we would get enough and put them in one pocket and crawl out, and maybe we would have to go away up on the big beams—all these old barns had big beams, and there was always a ladder, usually with three rounds gone—and then we would climb up and across where the buckwheat straw was, and get all full of cobwebs. Then the last place of all was under the barn floor, and we would wriggle under there and hunt all around in the dirt, and then come out and not have sense enough to stop up the hole so the hens could not get in. [Laughter.] After we got the eggs we didn't know what we had. We had to look through them toward the sun, and often found them bad, after all the trouble of hunting them. [Laughter.]

Eggs should be gathered every day, and then you know just what you have, and can say to your customers, "I will give you a dozen eggs for every bad one you find." When you can do this, people will gladly pay you five or even ten cents a dozen more for eggs they are sure are good. Be able to give a guarantee with your eggs and you will find ready sale at higher prices. [Applause.]

Mr. Evans—You spoke of feeding horse meat to your hens. How do you do it?

Mr. Rice—Unless you have a bone-cutter you can't use the bones. You cannot keep the meat very long, except in cold weather, but the best plan is to cut up the horse and boil the meat. It would not be profitable to buy a horse in the spring or fall, as you could not use it before it would spoil. In the winter you can keep it frozen, and cut off small pieces and feed to the hens. If there is any danger of its spoiling cut it up and boil it and you can keep it longer. It is cheap

and desirable as hen feed, and I pay $3 apiece for horses for this purpose.

Mr. Evans—How about drink for the hens?

Mr. Rice—We have water in pans standing under the nesting arrangement. We keep a supply on hand and let them help themselves whenever they want it. Give them skim-milk too, if you can. If you let them get hungry they will drink too much of the milk, however, and it will affect their bowels. Keep plenty of fresh water on hand for them, also.

Mr. Evans—How many hens would you keep, and in what sized house?

Mr. Rice—You can get as many eggs from a flock of 50 hens as from two flocks of 25 hens each, and it is not so much work to care for them. This is contrary to the judgment of some people, but we have tried both ways and think that flocks of 50 are about the right size. A house 15 feet square gives abundance of room for 50 fowls, certainly where you do not have to keep them confined all winter. With us, we have snows all winter, and we find that $4\frac{1}{2}$ to 5 square feet of floor space for each hen is ample.

Mr. Evans—Would you allow them to go out in rough weather?

Mr. Rice—I cannot speak to a certainty from your standpoint. It certainly does lower the egg production to let them out when there is snow on the ground, and I am inclined to think it would pay you better, even in this climate, not to let them out when there is snow on the ground. I think it would be better to keep them in than risk the exposure, and it is as well for them to have a certain temperature and keep them in all the time. The uncertainty of life in her make-up is not good for her. [Laughter.]

Mr. Smith—Is there any danger of fowls eating too much meat?

Mr. Rice—Yes, sir.

Mr. Smith—Is it better mixed with the feed, or not?

Mr. Rice—I would feed about an ounce a day per hen; that is enough. If you feed too much animal feed, especially of the fresh meat, you may injure her egg-producing qualities. The fresh meat is the best form, because it is easiest to digest. You can feed them too much of this and loosen their bowels. They can also be fed so they will lay only a portion of the egg, and the white of the egg be deposited without any shell at all.

Mr. Black—Have you a scratching shed for your fowls?

Mr. Rice—Yes and no. Yes, in the sense that the house itself is the scratching shed. We cover the floor with straw and make them scratch there for their grain each morning. You need not make a special arrangement for a scratching shed, as this answers every purpose.

Mr. Fitzga—What is the trough for?

Mr. Rice—The trough is for their mixed feed.

Mr. Evans—Would you keep them confined to the house in summer?

Mr. Rice—The more liberty the better.

Mr. Fish—How do you get them to lay in the nests then?

Mr. Rice—They will come back to their old nests if there are no lice there, and they will prefer this nest to anything else they may find.

Mr. Evans—Do you confine them with wire in yards?

Mr. Rice—Our hens run in a little orchard. We have large runs, and we are keeping hens in the small house where we raised chickens. This is temporary, until we can get the larger house constructed. We are going to have the yard double, 150 feet north of the house, 150 feet south of the house, and 15 feet wide. This is sufficient for them. We have arranged in this way to provide a change of ground for them every other year, because after a year the ground becomes more or less filthy. We abandon the one side and try and grow green crops there while the other side is being used. We have planted our trees with that object in view.

Mr. Fish—You would not have more than fifty hens in one body?

Mr. Rice—I would not have a good many houses, but I would have one continuous house with divisions in it. I know this will meet the approval of some, while of others it will not. Some advocate 35 or 40 hens to a house, and have the houses scattered all over a 20-acre lot. This is thought to be better on account of disease, but if you have the disease in one house the others will have it also, and the result will be the same. One gentleman I know of, in particular, who has been a strong advocate of many different houses; he has tried it for three years, and now he tells me he is going to build one large house. I went to see him some time ago, but I found it was too much work. It took very nearly an hour to go around and feed the hens, and life is too short. Keep them in a small space for the economy of labor. Push them the first year, then keep half—the best—to breed

from the next year, and the next year clean out the whole business, except a few very good ones. Force them for one or two years, and save time in taking care of them.

The Chair—How do you provide for ventilation?

Mr. Rice—That is an important point. Don't put the ventilator in the top of the house, for that takes out all the heat, and there is a counter-current of cold air falling around the heads of the fowls. The proper ventilation is the one from the floor, opening on the inside, low down, and at the highest point outside. Simply an opening between two of the studs, open inside at the bottom and outside at the top; that is all there is of it. Don't make any special ventilator, for this is best and simplest. I have a friend who is trying a small cowl on top, and it works well. He has had some small cowls made, and they are just the thing.

Mr. Heritage—Do you heat your house?

Mr. Rice—That is absolutely unnecessary. If you keep them heated you add to the danger from fire, and you make your fowls more tender. A house built as I have suggested is plenty warm enough, and the fowls will be as happy as larks in it.

Mr. Evans—How low does the temperature go in that house?

Mr. Rice—It will go down to freezing once in awhile. There is so much difference in temperature it is somewhat hard to say. The difference in temperature between your country here and 50 miles north of you is greater than 150 miles north of where we are. You get the benefits of the ocean currents here, and if you were traveling from 50 miles north of New York City, coming southward, you would note the difference very quickly.

Mr. Owens—Did you ever notice the yolks being lighter in color when the hens are confined?

Mr. Rice—Yes, sir. The cause of the color is due to two things—difference in breeds, same as the butter-fats in cows, and the method of feeding. Give them plenty of chopped clover hay, beets, corn meal, and such feeds will make the yolks as yellow as oranges.

Mr. Evans—Would it pay to make ensilage for them?

Mr. Rice—I don't know but that it would be a good thing, if it will keep. Corn ensilage is good, and we frequently feed it to our hens. We raise beets and turnips and feed them whole to the fowls.

Mr. Black—How about brewers' grains?

Mr. Rice—I never fed them.

Mr. Owens—Does green feed make the yolks yellow?

Mr. Rice—Yes, sir. You can even affect the plumage of the fowl by your feeding. I have tried it. I fed one lot of chickens on corn meal and another lot on the feeds I have mentioned, such as wheat bran, oil meal, skimmed milk, oats, &c. I had fifteen in each flock. I carried them on these feeds from the time they were two weeks old, and clear through the winter, and when I got through with them I could tell them apart by looking at the color of their legs. Their legs showed the yellow pigment from the corn.

If you don't give your chickens green food keep them away from corn. Give them wheat instead.

The Chair—Has the age of the chicken anything to do with the hatching of the egg?

Mr. Rice—Yes, sir. A pullet does not make as perfect an egg as a fowl one year old. Neither are there as good results in hatching as when one year old.

A Member—How would you select the eggs so as to secure the largest amount of pullets?

Mr. Rice—Ordinarily the young cockerel with old fowls will give most pullets. That is the general rule. So far as picking out the egg is concerned, you can't do it. The idea that you can tell by the shape of the egg is all bosh. Someone has said he could get most roosters out of the long eggs, but that is folly, and fails nine times out of ten.

Mr. Evans—Is there any difference in the quality of the meat of the chicken?

Mr. Rice—Yes; I have never made the observation myself, but you can feed celery or onions, and your can taste the flavor of the feed in the flesh. That is the opinion, but I don't know about it myself. There is no doubt you can change the color of the egg by feeding, and I understand it can be done in the taste of the flesh. There is a difference in meats. There is a difference in texture in the Indian Game fowls as against others. The Indian Game as an egg-laying fowl is a failure, as they lay small eggs and few of them. And the Buff Cochins! Oh, dear! If you take a Leghorn, a Plymouth Rock and a Buff Cochin, all hatched the same day, the Leghorn will lay five or six eggs to one of the Plymouth Rock, and if you can make the Buff Cochin lay at all it is better than I can do.

Mr. Evans—Would you keep all your fowls in one house?

Mr. Rice—I would keep five or six hundred in one house, but I would not undertake to keep several thousand that way.

A Member—Would you build wire partitions between them?

Mr. Rice—We are going to have wire pens made for our fowls. The house we expect to build will be 225 feet long, and we expect to divide it into fifteen pens, with fifty fowls in each, or 750 in all. We will have wire partitions between the pens.

We will have no alleyway in the house, although you may differ with me in this, but I will tell you why. In the first place, if you make the alleyway three feet wide you will lose one-fifth of your space, and then it takes longer to attend to the fowls. I would simply have a swinging door in each partition, with double hinges, so the door will always close itself. This will be just as convenient, and in some respects more so. The only time it will take him longer will be when he is in a hurry to get to the far end of the house, and he will be obliged to go through the doors, but the successful poultry-raiser should not object to this, as he has a better chance to get acquainted with his fowls if he goes among them more frequently, and he can then see if any of them are ailing in good time. He ought to go in there every day anyhow, and if he has an alleyway he will not get among his fowls as often as he should.

A Member—I have heard it said there is likely to be a draft in such a long house, with partitions of wire.

Mr. Rice—There might be some draft, but do not think there would be enough to do any damage. I may be able to tell you some other time how it works, although I am convinced I am right now.

A Member—You say you prefer to breed from fowls a year old?

Mr. Rice—I should say from fowls a year old or over. I would not keep any of them longer than two or three years, because, as a rule, that is as long as they are profitable. The first year of the hen's life is the best. It is a difficult matter to get hens to lay before it begins to get warm in the spring, and we find the best results from hens during their first year.

A vote of thanks was given the Professor.

LEAF-GREEN IN ITS ROLE IN CROP-GROWING.

BY BYRON D. HALSTED.

(Abstract.)

LEAF-GREEN IN ITS ROLE IN CROP-GROWING.

Crops are grown that they may feed the human race. Between the soil and the air—that is, the mineral kingdom and animal kingdom—there needs to be a middle group, which we call the vegetable kingdom. In other words, the animal cannot sustain life for long upon inorganic substances, but requires for his existence one or more of those compounds that are produced directly or indirectly by plants. It is therefore the peculiar function of plants to combine the compounds of soil and air, and produce other substances that we call organic compounds. It is the purpose of the present talk to show where these changes, or series of changes, take place and the favoring conditions for the same.

There is a very natural division of all plant processes into those that are for the increase of the individual and those that are for the formation of new units; in other words, into those that perfect and preserve the individual and those that provide for the continuance of the species—that is, into the vegetable and the reproductive functions. At this hour we are to disregard the latter processes and concern ourselves with those matters that arise for and find their direct end in the stability of the individual plant.

Normal plants, so far as their increase in size is concerned, may be divided into three members, namely, the roots, stems and leaves. Time does not permit of any lengthy consideration of these, but in passing it may be said that the roots usually serve to anchor the plant in the earth and absorb therefrom the various salts dissolved in the soil-water, several of which are needed by the growing plant. The leaves as a rule are expansions of varying breadth and thinness, borne in mid-air by the stems according to a closely-followed arrangement. In short, the stem separates the roots located at its lower end and buried in the soil often to considerable depth, from the foliage upon the much-branched upper portion that stands exposed to heat and drought, sunshine and storm, that may obtain above ground.

It is to the leaves that our further attention is directed, the roots and stems being considered only as they are subordinated to the functions of the foliage. The crude sap is absorbed by the surface of the young roots and passes through the larger ones, up the stem and out through the various branches until it reaches the leaves. It is there combined with substances coming directly into the leaf from the air in the form of gases, and as a result the various compounds produced, as sugar, starch, oil, &c., become the true food of the plant, and incidentally the sustenance of any animals that may prey or feed upon them.

All processes in the plant that result from the use of the organic compounds and have to do with the exceedingly complicated subject of growth, interesting as they are, must be set aside, for time will only serve to treat of that chapter which is but an introduction to plant assimilation. In short, we are to consider the method of food-making and not of its use in the economy of the plant. We are to deal with that process which involves the construction of those substances that directly or indirectly provide the sustenance for all living things, whether they be plants or animals.

As we come to the subject it is with bowed heads, for the portion that is absolutely known concerning it must be as nothing when compared with the dark but fertile continent of the unexplored. The leaf is the minute laboratory in which a noiseless chemist is at work constructing compounds that possess a potency absent from those that were used in their production. This laboratory is constructed of cells or sacs, held together by a framework of tough strands of various sizes, each suited to its position in the structure. There may be only a single stout bundle of fibers at the base of the leaf joining it securely to the stem ; but as the leaf broadens, this bundle divides and continues to split up into smaller strands until there is a fine network or mesh for holding the soft pulp of the leaf in place. Over all this is a tough, transparent skin through which there are small holes to the number of a hundred thousand or so for each square inch. We thus have the three structural elements of the leaf—its framework, the pulp cells, and a protective skin that is over all, and yet more open than a porous plaster. The simple mention of these parts of a leaf is enough to show what portion is laboratory proper, and what are the walls and covering of the building, so to speak.

The part that interests us most is the pulp of the leaf, namely,

that which lies beneath the skin and between the fibers that furnish the mechanical support. This soft portion, so tender that it cannot maintain itself without protection, is made up of cells of various sizes and shapes that are arranged so as to lie quite closely together in some parts of the leaf and in others so loosely that the spaces between the cells make more of content than the cells themselves. We gather from this that the working laboratory consists of a loose, cellular tissue of great delicacy, and the unit in this workshop is the single cell.

It is necessary for us to consider this cell both as to its contents and afterward as to its surroundings—what it is in itself and the relation that it bears to the outside world.

Under the microscope two things are apparent at once, namely, the wall and the granular substance within the sac.

Certain grains that float in the semi-fluid protoplasm contain a substance that gives a green color to the granules containing it and produces the characteristic refreshing color of the foliage and the young parts of stems of ordinary plants.

This green substance received in 1817 the name of chlorophyll—that is, color of the leaf, green of the leaf—and the minute bodies which bear it are called the chlorophyll granules. This chlorophyll is easily extracted from the grains by bruising ordinary leaves and drenching them with alcohol, when an extract is obtained of a beautiful rich green color when seen by transmitted light. This chlorophyll, in alcoholic solution, has many interesting physical properties, one of which is its fluorescence, namely, the power of so changing the light-rays that by reflection the chlorophyll solution appears blood red. This fact is mentioned in this popular treatment of the subject because of its close connection with the remarkable activity of chlorophyll under the influence of sunlight, to be mentioned a little later on.

When the alcoholic extract is evaporated, green crystals are obtained, made up chiefly of carbon, hydrogen, oxygen and nitrogen and a small percentage of ash constituents, but for our purpose we need not pursue the question of composition further; suffice it to say that the difficulty of separating the pigment from all entangled substances has made it impossible for chemists to agree upon any definite formula expressing its composition. Again, it is so closely allied to protoplasm that it is not unlikely that, as with that vehicle of life, it has a composition that varies with the different species of plants or the conditions of its production.

These chlorophyll granules, located in the living cells, are surrounded by a film of colorless protoplasm, and are borne along with its currents in the cells. In some water plants, for example, where the cells are large and few in number, one may see with the microscope this circulation of the protoplasm, made more striking by the many chlorophyll granules that are carried along and even tumble over each other at some sharp turn or when the currents intermingle. These movements may be increased by addition of heat, or brought to a standstill by lowering the temperature.

The point in thus touching upon this subject is to give the impression that in chlorophyll and the chlorophyll granules we are getting at the heart of the cell-activities and the center of the forces that move the world.

We are now prepared for a brief outline of the work that is performed by chlorophyll.

Priestley, in 1771, discovered that air in which candles would no longer burn could be restored to the original condition by growing plants. In 1779 Ingenhousz showed that this purification of the air by plants took place only in the sunlight. As a result of this discovery there was an awakening in physiological botany that has increased even unto the present day. Only three years after Ingenhousz's triumph Senebier demonstrated that plants obtained their carbon from the carbonic dioxide of the air, and early in this century (1804) Saussure showed that there was a definite relation between the amounts of carbon dioxide absorbed, carbon retained and oxygen given off by the plant under the influence of the sunlight.

Time does not permit of even a mention of the long list of names of those who have brought facts to light concerning the relation of the surroundings of a plant to its own upbuilding.

One would like to dwell upon the achievements of Kales, Boussangaut and Sir Humphrey Davy, of Hellriegel, Sachs, Strasburger, Prengiheim and Pfeffer, and our own Dr. Draper, but this is not a time for history and memorial thank-offerings.

That we may go a step further with our subject, the hearer will recall the statement that the materials of fertility dissolved in the soil-water and absorbed by the tender rootlets pass up through the stem to the foliage, and there the aqueous solution meets with the gases that are closely associated with the chlorophyll-bearing cells that make up the pulp of the leaf. Upon this loose tissue, bathed

with soil-water and the atmospheric gases, the sunlight falls in greater or less intensity through the live-long day. The energy of motion is transformed into the energy of position—kinitic into potential. Within the chlorophyll granules the energy of the vibrating rays of the sun splits up the molecules of the water or those of the carbon dioxide, or both, driving off a portion of the oxygen, an element that has a strong tendency to unite with the very elements from which it has been forced to disengage. Thus, if we should have six groups of the carbon dioxide molecules (6 CO_2) and five of water (5 H_2O), there might be a separation of twelve atoms of oxygen singly or in groups (12 O or 6 O_2) and a union of the remaining portion would give a molecule of starch, C_6 H10 05. This is synthesis, this is food-making reduced to its simplest terms, and the green protoplasmic granules that float in the semi-liquid plasma are the centers of the synthesis of organic compounds that afterward, through various changes, become complex and characteristic substances found without number in plants and animals. Each smallest divisible amount of starch represents a potential energy that may remain unobserved until the occasion comes for oxygen to unite with its elements, when it ceases to exist as starch, and in becoming carbon dioxide and water an equivalent of energy is released that may become sensible in work done in one or more of a hundred ways. This oxidation process in the starch is akin to burning, and it is easy for the mind to pass from it to the coal in the furnace or wood in the stove. The rapid union of oxygen with the coal liberates a heat that was stored up in latent form since the ancient days of geologic time, and by the chlorophyll granules in the immense leaves of giant tree ferns or other extinct plants of the carboniferous era. The trolley car that runs horseless along the country road, and the happy boy who races with it upon fleet skates over the frozen stream hard by, both move because the sun sometime, somewhere, has been driving a wedge between the molecules of carbon dioxide of the air and of water in the chlorophyll granules during the growing days of the last season, or it may be of some past century; and the compounds thus produced, either as coal for the engine's consumption or food for the lad's digestion, liberate the force that moves the car in the one case and the skater in the other. In other words, the sun's force raises the inorganic compounds to the higher plane of organic compounds and from there they may fall back, yielding in the fall an energy that physicists tell

us is equal to that by which it was raised, just as muscular energy may lift a heavy weight from the floor to a high shelf, from which it is always ready to fall, and were the machinery at hand the muscular energy thus expended may become active and serviceable even after years of long repose. Thus the clock weight, in falling by slow degrees, turns the many wheels and sways a pendulum through a week or more of time that it has indicated by audible tick, tick, and shown to the eye by hands upon the face.

Should anyone doubt the close relation that exists between the chlorophyll and sunlight in the production of food and fuel, it is only necessary to glance at the behavior of plants that are kept in darkness. All the conditions for growth may be supplied in the best possible form except that of light, and the plant will perish. Seeds may germinate and the embryo unfold into a plantlet, but it grows only until the nourishment provided by the parent plant is exhausted, and then the pale and spindling seedling goes to the ground. Healthy and vigorous plants when removed to total darkness soon lose their green color, and the blanched and sickly specimens die if light never comes to their rescue. That light is essential for the development of chlorophyll is as evident as that it is needed to maintain it. The celery seedling, as it struggles up through the soil, is without chlorophyll, but in the sunshine it soon becomes green and flourishing. As the season passes, inch by inch, the gardener buries the leaves, and at last the whole plant is under cover and soon is blanched. Potatoes are only stems grown underground, but when they are dug and left for a time in the sunlight they become green and poisonous for food. These familiar instances show that plants quickly respond to the sunlight and take on the green color, but lose it again after a brief period in darkness.

It is a well-known fact that plants seek the light. Potato sprouts in a cellar or other dark place will grow toward a window. In like manner plants in the open will bend their stems and leaves toward the side of greatest illumination. The housewife needs to turn her window plants occasionally, or they become much "drawn" and misshapen.

The light, however may be too intense for foliage at certain times, and then the leaves endeavor to avoid the glare. Thus grass leaves may coil up, while others, as the bean, place the leaflets edgewise to the sun. In short, there are very many ways that plants have of either turning the leaves toward or away from the source of light. This is so characteristic of some plants that they are living compasses.

The position of many leaves is quite different in daylight from what it is at night, and, as in the latter there is a tendency to fold up, the night position is naturally known as that of the sleeping plant. In the clover or oxalis, for example, where there are three leaflets, the folding at night is quite noticeable. If we were upon the watch it would be found that the positions of parts of plants were changing nearly constantly, but so slowly as not to be generally observed.

Some persons still sceptical may maintain that many plants never have any chlorophyll. This is true, but they are not of the ordinary sort and obtain their food at second hand. They either feed upon organic substances, such as the products of synthesis, or prey directly upon the vital substances of a living plant. The mushroom may flourish in a dark cavern when organic material, heat and moisture abound, and the rust fungus gathers sap from the stalk of grain and produces an orange color instead of green. The mildews, moulds, rusts, smuts and blights feed upon the products of the chlorophyll, and, taking no part in the building up of organic compounds, are truly those exceptions that prove the rule already stated.

These parasites are not confined to the toadstool and other fungi which, in their method of nutrition, are more nearly animals than plants. They are destructive, instead of constructive, to the surprise and dismay of the crop-grower. Flowering plants are sometimes parasites, and steal their nourishment from the plants upon which they grow. The dodders are among these, with their thread-like stems, white or yellow, and leaves reduced to merest scales. They become rooted in the stems of our clover or flax, onions or egg-plants, and almost cover their unfortunate prey with the lacework of fine stems and clusters of small flowers. Others of this class may rise rapidly through the blanket of old leaves in the forest, and with a large drooping flower have the shape of a pipe and the whiteness of coral. Such plants are fastened to the roots of trees and shrubs, and rob them of the food they have made in their leaves and stored up underground for future use.

But there are many plants that show no green and yet are not of the above class. There are the so-called "mosses of the sea," bright as roses and as far from green in color as can well be. There are many ornamental plants grown for their bright, ever-gorgeous foliage when chlorophyll seems to be absent. It only *seems*, for the leaf-green is there, although the leaves are not green. You may add sugar

to the pie-plant or rhubarb sauce until the sour is gone or until you may find it palatable. The sharp acid is still there—its edge is dulled by the sweet, a mask has been applied. So in these brightly-colored plants. If they are in the height of their vegetative activity, there is a masquerade, and when, with the microscope, the disguise is penetrated the chlorophyll granules are found, and presumably as active as if the bright color was absent. Alcohol quickly dissolves out the chlorophyll in such as in ordinary plants. In fact, were we to dwell upon the subject it might be shown that the bright color is probably to screen the chlorophyll or so act upon the light-rays as to make them more powerful. The red-leaved beet grows alongside of the green-leaved parsnip, and both flourish equally well. The problem of life has been worked out by each, but along quite different lines, and man does not know the antecedents of the characteristics of each species.

There are plants that are pale, wholly or in part, and have less than the ordinary amount of chlorophyll, and such variegated plants are less hardy, more subject to attack of fungous enemies than their deep-green mates. They prove no exception to the rule.

Having established the close connection between chlorophyll and sunlight in the production of food and fuel, let us now glance at the sun and note what portion of its light is most effective in the processes of synthesis. A beam of sunlight passing through a glass prism is separated into seven component parts, each giving a color of the rainbow. Thus there are the violet, indigo, blue, green, yellow, orange and red rays. It was no longer ago than 1844 when Draper found that the rays causing the decomposition of carbon dioxide and water are the orange, yellow and green. Pfeffer, in 1870, found that the yellow rays were as effective as all the other rays combined. It would be fatal to use blue glass for the sash in green-houses, or any other than the colorless glass. We can scarcely hope to improve upon the ordinary everyday sunshine, take it as it comes, for the production of field, orchard and garden crops.

Other light than that of the sun will in a measure replace daylight. Thus plants have been grown with electric light, and at one time it seemed that this would prove a profitable supplement to sunshine in the growth of greenhouse plants, especially during the shortest days of the year, when plants have a struggle with insufficient light, but of late we hear very little in electro-floriculture.

Looking at our subject from the standpoint of the leaf and its chlorophyll, in view of the facts above stated it would seem evident that the foliage of growing plants needs to be so situated that it can have a full share of the sun's rays and at the same time receive sufficient soil-water to meet the demands of synthesis and evaporation and obtain its necessary amount of the gases from the atmosphere. In other words, all our crop-plants need to produce a maximum amount of leaf-pulp for the good of the plant and be able to maintain it until the demand of plant nutrition ceases. This condition is doubtless the exception, and it becomes the crop-grower to have the greatest regard for the foliage of his plants. Overcrowding of the stalks of wheat may result in numerous but puny heads, both upright and empty. For the same reason the orchard may need pruning before the wholesome sunshine can penetrate the thicket and bring rosy, sparkling health to the otherwise dwarfed and insipid fruit.

A general principle, well digested, will find its constant application, and it has been shown that a plant's life depends upon the leaf-green and the energy of the sun's rays, and all success in crop-growing rests upon keeping the solar chemist working to the best advantage in the plant laboratory. Guard the best interests of the leaves; give them sufficient space, that they may be well lighted, and see that a full supply of the right soil constituents reaches them without dangerous delays.

Success in a tree may be measured by the number of leaves that work to their full capacity through a natural lifetime, each leaf falling not prematurely by drought or disease, but at last sending back to the stem the life-blood it can no longer use, and, clothing itself in crimson and gold, sheds a glory upon the branch it no longer may serve.

If this incomplete attempt to elucidate a fundamental principle in plant growth shall stimulate anyone to a more rational care of crop-plants it will have accomplished its end.

Gov. Hoard—I have been exceedingly interested in following the Doctor, and would like to ask him whether his subject is not one that would also affect the production of milk. Is not the grass in the most highly nutritive condition where the chlorophyll is most abundant?

Dr. Halsted—I would say yes, speaking generally.

Gov. Hoard—Take grass at two and a half inches croppage, and there is no other food on earth from which the cow can produce so

much solids in her milk as with this food, and it strikes me that this principle, of which the Doctor has spoken, is of very great importance.

I have noticed when the grass is in its highest color it is most succulent and produces the yellowest milk; when the grass begins to turn brown and woody, the milk loses part of its color, and becomes paler, and it seems certain that these two questions are closely allied.

Dr. Halsted—I cannot answer as to the effect of the chlorophyll on the color of the milk or butter. The chlorophyll is composed of two substances, one of which is a bluish and the other a yellowish color. What becomes of the bluish color I don't know.

Gov. Hoard—Plenty of the milk is already blue enough. [Laughter.] It seems to me the analysis of this process of nature is applied judgment, understanding of nature, and all the most practical work with the herd. It seems to me the Doctor has given us some exceedingly valuable points in connection with dairy farming. One of the greatest stupidities of all our management of our cattle is in the preparation of their feed. We find the farmers who have grown gray-headed in the business of farming cutting their hay when it is at its least nutritive and least valuable stage, simply for the reason that it will "go further." I asked a farmer not long since, who used this as his excuse for late cutting of his grass, why he didn't feed brush and straw and stuff of that kind, because they would go further yet. [Laughter.] You should cut your grass when it is in the best condition for the use of the cow in her work of producing milk, and there is no time when the grass will produce more solids in the milk than when the croppage is from two and a half to three inches long. Some men will tell you it is full of water, but you have no other food that can equal it for the economical production of milk. I think the Doctor has thrown a ray of light upon it here, and it is well worth thinking of.

Dr. Halsted—I have here a bottle of chlorophyll in alcohol, which I neglected to present, but which you can examine if you wish. You will notice that it is of a beautiful green color.

ENTOMOLOGICAL WORK OF THE YEAR.

BY PROF. JOHN B. SMITH.

ENTOMOLOGICAL WORK OF THE YEAR.*

It goes without saying at the present time that the Entomologist has been busy, more or less, in investigations concerning the San José scale, and there is no doubt that this is an extremely destructive insect, if left to itself, which really merits almost all the attention that it has received. I have again followed it up closely during the season just passed, and, as a result of the observations and experiments made, feel that there is no further need for any very serious alarm. We have now a very full knowledge of the life history of the species, and we know how it may be killed; it remains only to do it. My talk to you last year was devoted almost entirely to this insect and to an account of my trip to California. It seems natural, then, that I should take up the subject now where I left it off then, and I do that by saying that all the insects that were introduced into New Jersey from California last year have died out. There has not been even a trace of the creatures discovered by me since their liberation in 1896. You may remember that when this matter was first spoken of I was not very enthusiastic as to the possibilities of success, and the result has been almost exactly what I thought it would be. It is rather a violent change from the climate of Southern California to that of Southern New Jersey, and from the warm, dry atmosphere of the Pacific Coast to the wet, cold winds of the Atlantic. If it be objected that the San José scale has stood the change, it must be answered that there is nothing to show that the scale is a native of California, and, indeed, the evidence, as it accumulates, seems to show that Japan is more than likely to be the real home of the insect.

I have made it a point to keep in touch with the California experiments with lady-birds made during the past season, and have corresponded with several of the County Commissioners, including some of those who were most enthusiastic on the subject of lady-birds when

* This lecture was illustrated by lantern-slides, some of which are reproduced here by illustrations.

I saw them. The insect with which they dealt and upon which they depended for the greatest benefits was *Rhizobius ventralis.*

Nearly fifty thousand of these insects were introduced into San Bernardino county in 1896, and during the previous year at least as many had been placed in orchards there. I am informed by one of the Commissioners for that county that the black scales are worse now than ever they were; that the *Rhizobius* has died out as fast as it was introduced, and that it was of absolutely no benefit in controlling the scales. Everywhere in that county they are now engaged in fumigating systematically, and have abandoned reliance upon lady-birds completely. Even in Santa Barbara county, the home of President Cooper and where he had such excellent success with the lady-birds, I am informed that the Commissioner has asked the Supervisors for an outfit of tents for fumigating purposes. Several of the largest orange-growers have already arranged to fumigate, simply because the black scales have increased so while they were waiting for the lady-birds to clear the trees that it is now either fumigate or lose your orchard. It is perfectly natural that this should be so; it was expected by me and, in fact, I could not see how it should be otherwise. In the native home of the black scale, where also the *Rhizobius* is native, it is injurious, and not kept in check by its natural enemies. They are there compelled to use remedial or insecticide measures, and it seems absurd to expect that *Rhizobius* will do in California what it will not do in Australia, especially as the parasite of the *Rhizobius* is now also established in California.

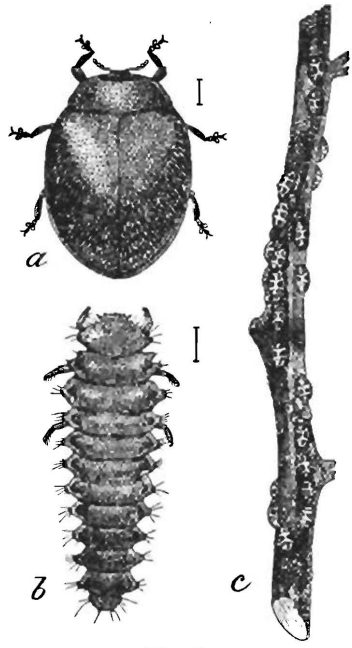


Fig. 1.

Rhizobius ventralis.—*a*, larva; *b*, beetle, both greatly enlarged; *c*, a twig infested by black scale, natural size. (From Div. Ent., U. S. Dept. Agri.)

Nevertheless, I believe we ought not to miss any chance of making use of natural enemies, and diseases as well as predatory insects are enemies. Probably most of you have read in agricultural and other

Fig. 2.

San José scale attacked by the fungus *Sphærostilbe cocophila*. The pale circles around the scales are the orange fruiting processes and in some cases the scales have dropped off.

papers concerning the scale disease that was found in Florida. I believe that I was one of the first that learned of its existence from Professor Rolfs, long before anything was published on the subject, and already, in 1896, I had received cultures and attempted to introduce the disease into an infested orchard in New Jersey. I mentioned this fact at the last meeting; but the 1896 experiments did not turn out well, because our knowledge of the habits of the fungus was at that time very incomplete. In 1897 experiments were continued, and while they were not so successful as was hoped, they did result in a sufficient knowledge of the habits of the disease to enable us to work another season with much more chance of success. (See Fig. 2.)

Experiments were made this year with culture material obtained by the courtesy of Professor S. A. Forbes, of Illinois, and with infested twigs obtained early in the season from Professor Rolfs. The fungus culture was applied in several places, but under such circumstances that it did not "take" except in one instance and on a single tree. It is pretty thoroughly established, however, on this tree, so that we will have at least an opportunity of testing the question whether or not it will live through the winter. Much better success was obtained with the twigs that were received from Florida. These were tied to infested trees in an orchard in Burlington county, and in September it was found that the disease had established itself on the scales on almost every tree on which the infection was introduced. The evidence of the presence of the fungus is perfectly clear, and on the trees on which we had the "take" hundreds of the scales were diseased. Here we have a real center of disease for the scale, and this will give us an excellent opportunity to determine just what it will do in our climate. Of course, if we find that the fungus stands our winters, it will be good policy to introduce it wherever the scale itself occurs, and to trust to its natural dissemination to find and keep them in check in our orchards and in wood and scrub land where it has obtained a footing. I say to keep in check, for I do not believe that this disease or any other natural agency will exterminate. In fact, extermination can no longer be hoped for, because the scale has established itself in so many places in our State and under such circumstances that we cannot possibly reach it. (See Fig. 3.) It is an enemy that must be persistently dealt with by the fruit-grower, if he intends to secure fruit. I do not intend to go into any details as to the methods by which the insect can be controlled. Bulletin 125 of

the Experiment Station does that for me, and a full resumé of the experiments made will be found in the annual report of the Station. We *can* control the scale; we *must* control it if fruits are to be grown. It is even a question whether the occurrence of the insect has not been of advantage in making our growers more careful, more thorough in their work and more intent to study the needs of their crops than they have done in the past.

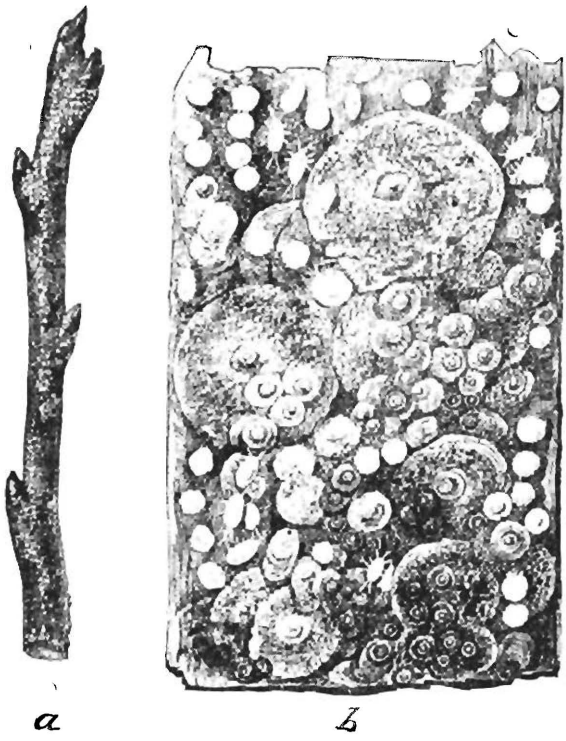


Fig. 3.

a, twig infested by the pernicious scale, natural size; *b*, bark as it appears under a hand lens, showing scales in various stages of development and young larvæ. (From Div. Ent., U. S. Dept. Agri.)

I have not allowed the San José scale to take *all* the time during the summer. An interesting series of experiments has been carried on with the peach borer, and we have learned much concerning the life history of this insect, and something, also, as to the best methods of controlling it. (See Fig. 4.)

The peach borer itself is a caterpillar, which is found during most of the year working at the base of peach trees, just a little below the

Fig. 5.

Seedling peach trees, showing borer injury: *a*, completely girdled and burrow extending down tap-root; *b*, burrow ending in root mass; *c*, example of repairing injury; *d*, boring made into the center of trunk. A little enlarged, from original photographs.

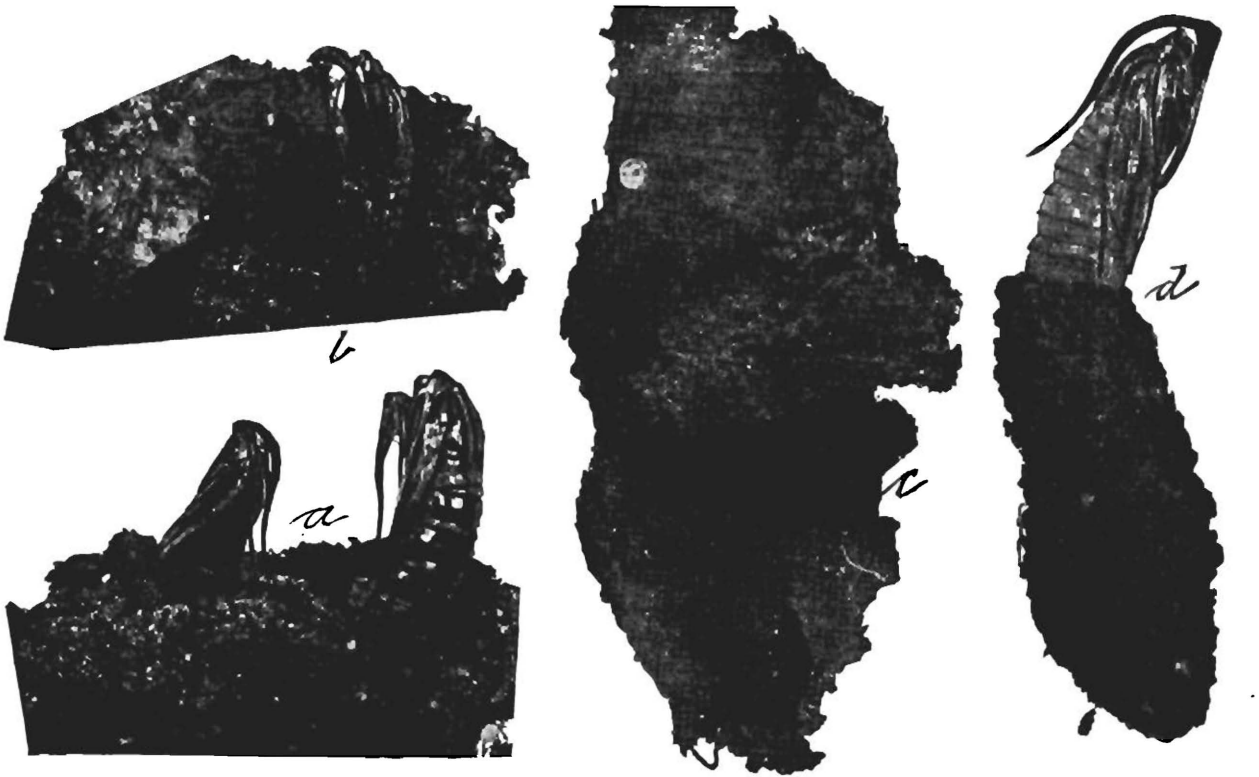


Fig. 7.

a, *b*, empty pupa skins projecting from bark and gum at the surface of ground; *c*, cocoon attached inside of bark just below the surface; *d*, cocoon from which empty pupa skin projects. From original photographs, considerably enlarged.

surface of the ground. In young trees it very frequently kills the attacked plants, and does really attack even very young plants. Dr. Halsted has found it on seedlings grown on an experimental plot, and I have frequently heard of its existence in nurseries and have

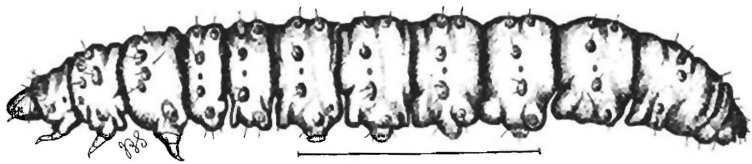


Fig. 4.

The peach borer: larva of *Sanninoidæ exitiosa;* enlarged. Original.

seen it on nursery trees. One of our good orchardists tells me that he never sets a peach tree without examining closely for borers, and that he protects his trees by wrapping with newspaper even before they are actually set out. Peach trees, under favorable circumstances, resist borer attack very strongly and repair injury with great rapidity. (See Fig. 5.) Even the seedling, when the borer has left it, will undertake to repair damage, and will in many cases make a growth sufficient to sell it, although it rarely makes a bearing tree.

The borers are found under the bark in spring, ranging in size anywhere from one-third to nearly an inch in length, and they continue feeding until sometime in June, when the largest begin to form a cocoon of chips and gum, mixed with a little of their own excrement, and lined inside with silk. This cocoon may be in the soil outside of the bark, or inside between bark and wood, and it remains in this stage for nearly a month, so that not until toward the end of June do we have any moths.

The pupa itself is of the usual shape, and is furnished on the head with a sharp cutting edge to enable it to get out of the cocoon. (See Fig. 6.) Around the edges of the abdomen are series of spines, and by means of these the insect gets a purchase that enables it to wriggle round and round, so as to cut through the cocoon or, if necessary, to work its way through the soil to the surface. (See Fig. 7.)

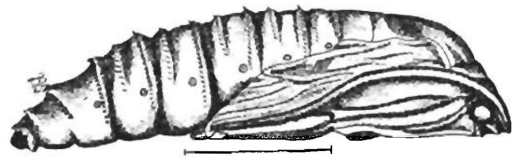


Fig. 6.

Pupa of peach borer. Original.

The moths that result from these borers are very pretty creatures

and resemble wasps about as closely as anything else. In fact, in the majority of instances, if the growers see the insects at all, they take them to be wasps and pay little or no attention to them. There is a considerable difference between the two sexes, the males having the wings almost entirely transparent, the body slender and banded with yellow, so that the resemblance to a wasp is striking. (See Fig. 8.) The females are considerably larger, with the hind wings only transparent, while the fore wings have a bronzed metallic shading. The body is bluish in its general color, also with a metallic glisten, and in the middle there is a broad orange band, by means of which the insect can be at once recognized. The moths come out early and are usually flying at eight o'clock in the morning on a clear day; but may come out at any time before noon if it is cloudy or chilly. They mate almost at once, and immediately thereafter the female begins the business of her life—laying eggs. (See Fig. 9.)

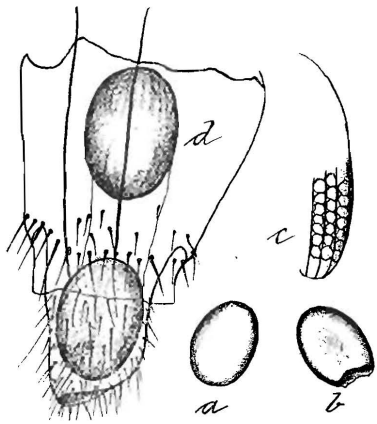


Fig. 9.

a, Egg of peach borer; *b*, egg from which larva has hatched, both enlarged; *c*, surface of egg, yet more magnified; *d*, tip of abdomen of female moth, showing eggs in the oviduct. Original.

Eggs are laid almost anywhere on the trunk and sometimes even on the lower branches. The insect moves about from place to place, attaches an egg here and there, and sometimes deposits a number of them in a little cluster. The ova are perfectly developed as soon as the insect leaves the cocoon, and in a female which I dissected two hours after she was born, before she had a chance to mate, I found nearly 490 brown eggs and almost another hundred that were not fully developed. In another specimen I counted 625 eggs, nearly all of them ready to be laid. A single insect, therefore, may seed down an entire orchard under favorable conditions; but conditions must be favorable, and it seems that some factors which we do not yet know keep these creatures in check to a very considerable extent. The moths are not long lived, and unless they get an opportunity to lay their eggs almost immediately, die or deposit them unfertilized.

Quite a number of experiments were tried during the season, which are detailed in a bulletin now ready for the press, so it will not be

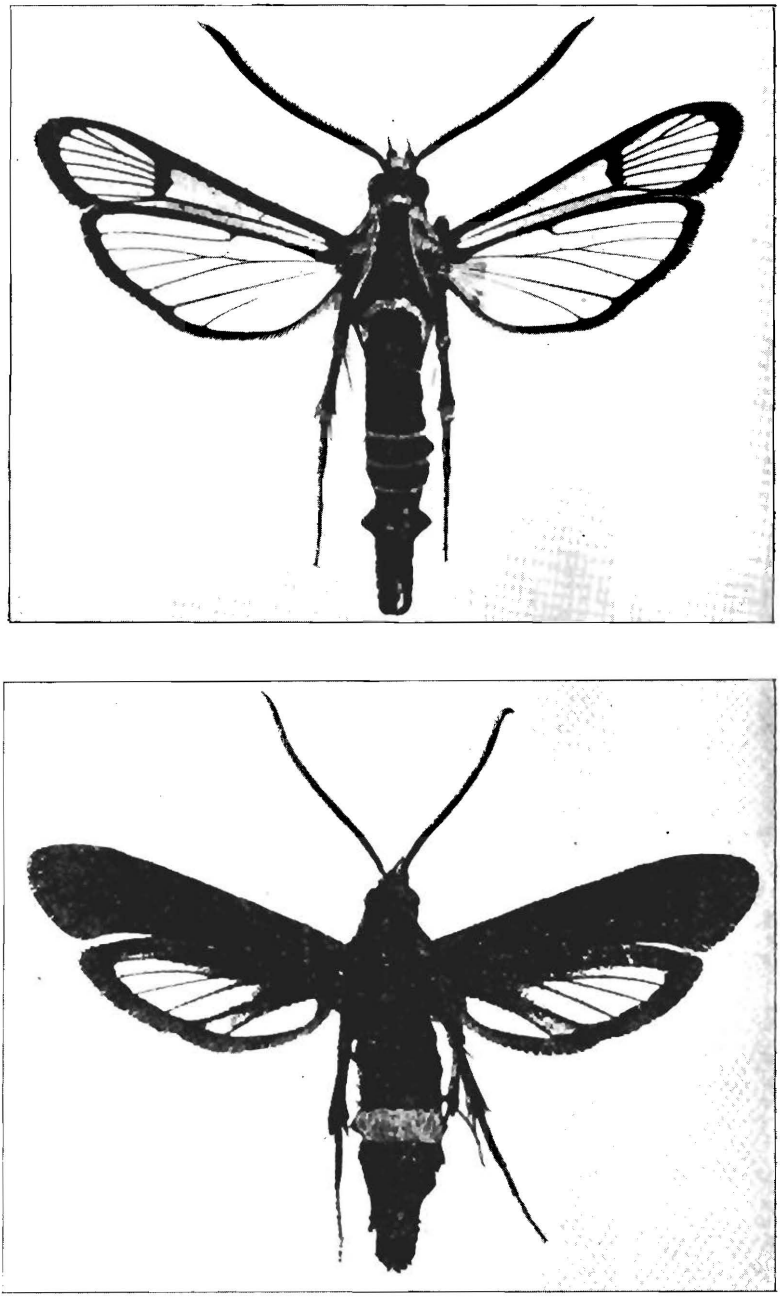


Fig. 8.

Moth or parent of peach borer, *Sanninoidæ exitiosa* Say. Upper figure male; lower, female. From original photographs, much enlarged.

Fig. 11.

Showing injury to apple twigs caused by plant lice From original photograph.

necessary for me to go into the matter at length at this time. I need only say that we can control the insects by wrapping the trees with newspapers or by painting with hydraulic cement and skim-milk.

One important point—and this must not be forgotten—is that the insects have a much longer period of emergence than has been assumed, and that while the first moths do not come until almost the end of June, much later than has been supposed, the last ones do not leave us until the beginning of September, also much later than has been believed. We must, therefore, keep our trees protected during the entire summer and until the middle of September.

One of the notable features of the late fall of 1896 was the unusual abundance of plant-lice eggs on fruit trees of all kinds. (See Fig. 10.) Apple in particular, and to almost the same extent plum and cherry trees, had these black, shiny eggs attached to leaf-buds and all around the twigs close to the tip. In 1897, just as soon as the season opened, plant lice were out in force, and fruit trees of all kinds were attacked. Now it is nothing unusual to find plant lice on fruit trees early in the season; but ordinarity the first warm, dry spell puts an end to the injury, the trees are practically exempt for the rest of the summer and only tend to become lousy again late in the season. The difficulty with the spring of 1897 was that we did not get any warm, dry spells, and until well along in July the wet, cold weather favored the development of these plant lice, so that everything soon became horribly infested. Apple trees had the terminal shoots covered by the insects and fruit; blossoms and leaves were bunched up in such a way as to check development—in some cases to kill the new shoots entirely; in the best instances to injure the fruit to a serious extent. (See Fig. 11.) Plum trees were so bad in some places that heroic measures were adopted by growers on the theory that it was just as well to kill the trees by the application of insecticides as to let them be killed by the insects. But in good time the necessary warm spell and dry weather made its appearance, and when it did the plant-lice attack was at an end.

Most of the troubles from which we suffer in this country are caused by foreigners, and so we have, moving up in our State, a new enemy to asparagus. It has been known to me for several years; I found it in 1895, in Gloucester county; the following year it reached Camden and parts of Burlington counties, and in 1897 it spread throughout the entire asparagus-growing district of New Jersey, from

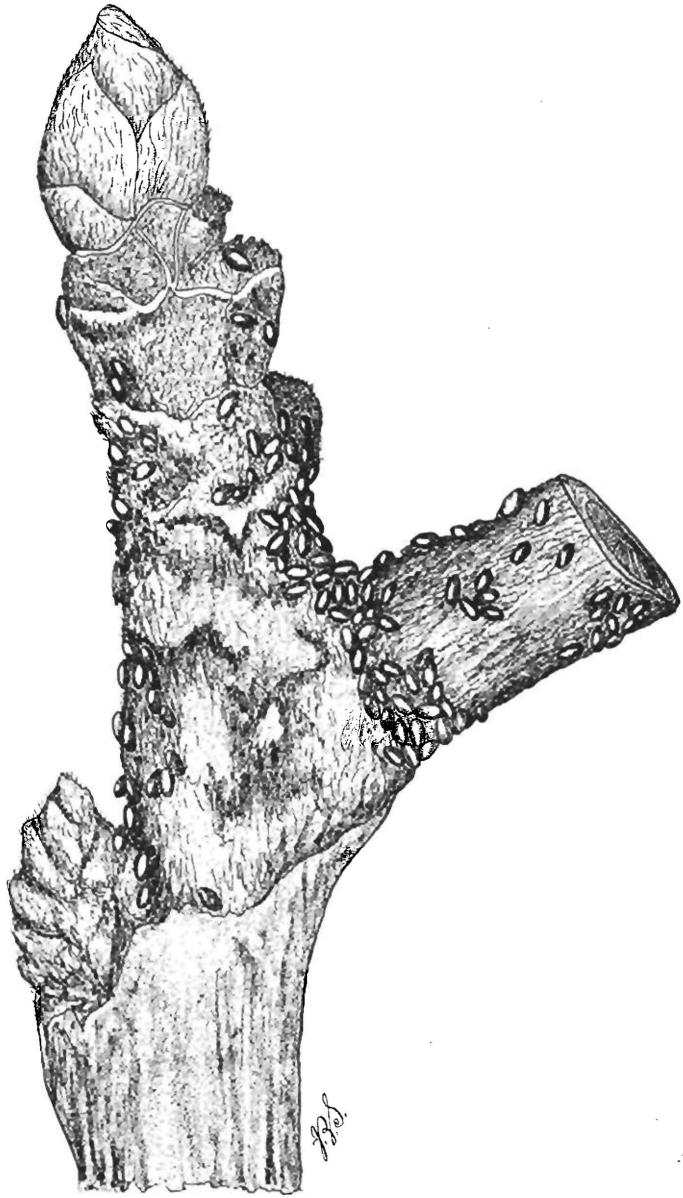


Fig. 10.

Eggs of plant lice on apple twig, very much enlarged. Original.

the Delaware to the Atlantic, and from Cape May to the red shale line. This is the twelve-spotted asparagus beetle, and it differs from the common form by the fact that it is rather larger, orange-red in

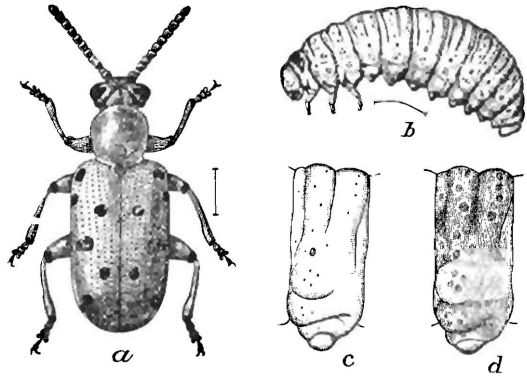


Fig. 12.

The twelve-spotted asparagus beetle: *a*, adult; *b*, larva; *c*, *d*, two of the larval segments. All much enlarged. (From Div. Ent., U. S. Dept. Agri.)

color and has twelve little brown spots on the surface. In its general life history it does not differ very much from the common species, except that the larva prefers to bore into the seed capsules of the

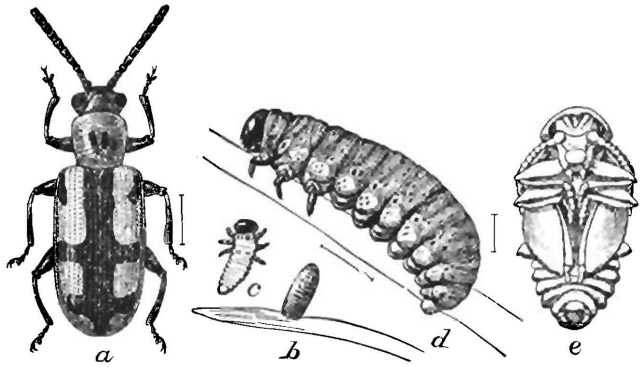


Fig. 13.

Common asparagus beetle: *a*, adult; *b*, egg; *c*, larva just hatched; *d*, full-grown larva; *e*, pupa. All much enlarged. (From Div. Ent., U. S. Dept. Agri.)

plant. It was no uncommon thing during the latter part of the summer of 1897 to find the berries on asparagus plants with big, fat, greenish-yellow larvæ eating out the inside. The common species still remains in its usual abundance, but practically not much injury

is caused, where the growers take a few precautions. Insecticides are rarely necessary on fields that are cut for market. On these we can either clean off everything every few days, so that no eggs can develop, or, if we want to keep the cuttings for market free from eggs and clean in appearance, we can allow a few shoots to grow up throughout the field until they become entirely covered with eggs; then these shoots should be cut off and burned to destroy the eggs and others left to take their place. When the cutting season is over, if this trap method has been used, all the beetles will have laid all their eggs, and the result will be a clean field until late, so that the

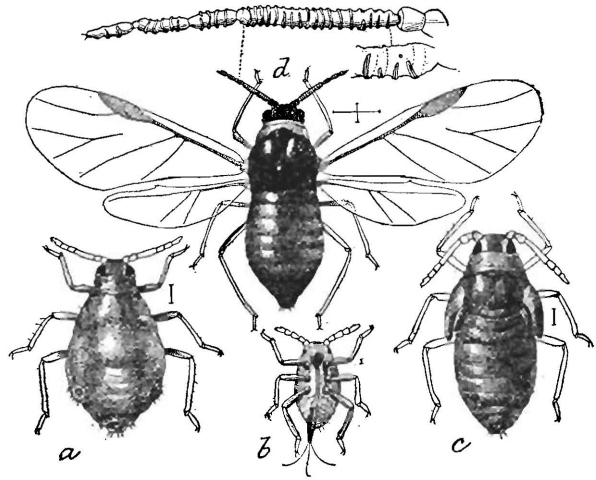


Fig. 14.

Woolly apple louse: *a*, agamic female; *b*, larval louse; *c*, pupa; *d*, winged female, with antenna enlarged above. All greatly enlarged and with waxy secretion removed. (From Div. Ent., U. S. Dept. Agri.)

plants, when in full foliage, will be very little injured. If the slugs do get bad, especially on young beds, nothing is much better than air-slaked or the dry hydrate of lime, which should be scattered early in the morning or when the plants are a trifle moist. The lime will burn holes through the skin of the larvæ and kill them.

For two or three years past the woolly plant lice have been getting increasingly abundant on apple trees. (See Fig. 14.) A few years ago it was rare to see a patch of these lice on the trunks of trees, but during the past season there was no difficulty in finding any quantity of them in

orchards everywhere. As a rule, a group of the insects will be found where there is a scar or an injury of some kind on a young trunk or branch. Old trees suffer little, comparatively speaking. The difficulty with these insects is not so much in the trouble that they cause above ground, because that is easily checked at any time by the appication of kerosene or soap mixtures; but they work under ground as well, attacking the roots, and here is where they do their real damage. They puncture the fibrous roots and suck the juices, and wherever they they begin to suck a gall forms, be- becomes hard and corky, and after awhile the insects leave it and start in a new place. (See Fig. 15.) Then we have a root-gall, or a root-knot, the origin of which is obscure unless we can find at the same time tufts of these woolly lice on other, younger roots. In some parts of the country these insects cause great injury; at present comparatively little damage is done in New Jersey, but it is well that our fruit-growers should be on the watch, and it is well, also, that they should know that kainit or ground tobacco, worked in around the roots of the trees, will serve to destroy the pests.

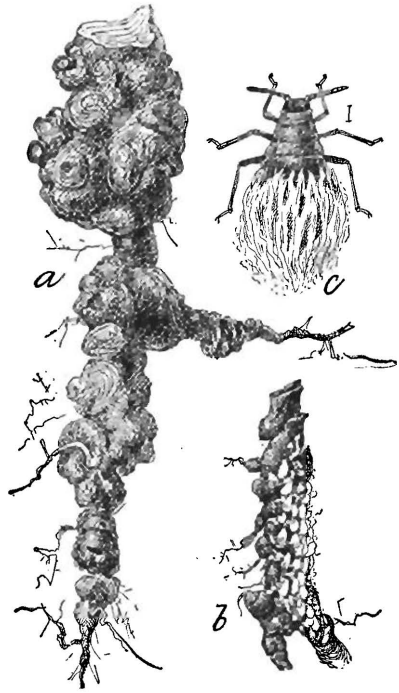


Fig. 15.

Woolly apple louse: *a*, root of young tree illustrating deformation; *b*, section of root with aphids clustered over it; *c*, female root louse, much enlarged. (From Div. Ent., U. S. Dept. Agri.)

Underground insects, by the by, are among the most difficult to deal with by insecticide measures. You cannot see the insects at work and cannot even know that they are present until the results on the plants indicate the fact. We plant corn, and find that it does not come up, or, if it does, that it soon dies down, and when we investigate we find wire worms or some similar pest, and the question comes up at once, "What shall we do to rid the land of wire worms?" and that question has not yet been answered. Of course, it is possible to apply insecticides that will kill wire

worms, but the cost will be greater than the value of the crop to be raised; therefore the matter is not practical. In truth, this is one of the cases where we must depend for freedom from injury rather upon our general treatment of the land and the rotation of crops. We know that the insects favor grass lands; we know that they require two or three years to come to maturity; we know that fall plowing will kill whatever insects may be then in the pupa stage and will kill a good many of the wire worms themselves. We know, also, that a good many of the active wire worms live over the winter, even in plowed fields, and may be troublesome in the following spring; therefore it would be a good thing to put in, following fall-plowed sod, some crops which wire worms do not attack, and no grass at any rate until the season following. By the term grass is meant any crop belonging to the family of grasses, like wheat, rye or corn. We know, also, that the beetles, when they appear in spring, lay their eggs only in sod land; hence it is a good plan, if we cannot fall-plow in all cases, to plow so early in the spring that the beetles will not find any temptation to lay on land that we want to keep free from wire worms.

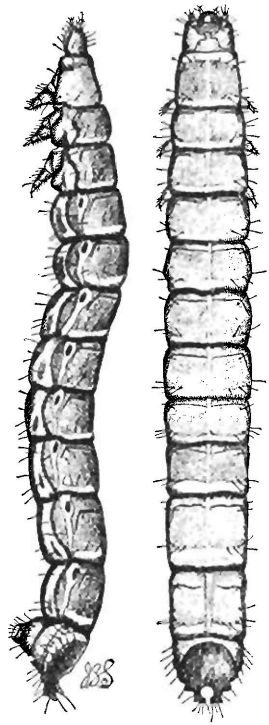


Fig. 16.
Wire worms from above and side, enlarged. Original.

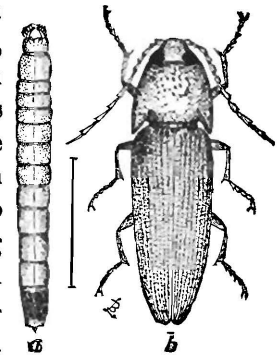


Fig. 17.
A click beetle, *Melanotus communis*. After Bruner.

Of course, we are constantly on the lookout for new insecticides, and particularly for such as might act upon underground insects; therefore, I was attracted by the advertisement of the "Gray Mineral Ash," which was supposed to kill everything and to be very much cheaper than Paris green or any other insecticide put upon the market. Now I am always suspicious of insecticides that are warranted to kill everything. We have learned from practical experience that there is

no substance that will under all circumstances kill all kinds of insects. I have tried to tell you again and again that contact poisons and stomach poisons are of quite a different nature, and that, except in the rarest instances, a contact poison could not act as a stomach poison; nevertheless there are always a sufficient number of farmers who do not keep these points in mind to make it pay to advertise new insecticides heavily. But this "Gray Mineral Ash" did seem to offer a chance of doing satisfactory work in some directions, and, therefore, a considerable series of experiments was made, particularly with the object of testing it on wire worms. I am sorry to say that they were failures throughout, and this "Gray Mineral Ash," like many another thing, has no field in competition with what may be called the standards—the arsenites, oils and soaps. Incidentally it did appear while experiments were being made that wire worms could not stand dry soil or exposure on the surface. The insects must be moist in order to live, but whether this fact is of any importance practically or not I cannot yet say. It is certain that if we keep wire worms for even twenty-four hours in dry soil they die, and if you keep them on the surface they will not live more than a few hours. There is not much to them when you come to dissect, and they are so thick-skinned that unless the surface is kept wet they dry up and become so rigid as to die.

Strawberry plants have been seriously hit during the past season by leaf rollers, and these leaf rollers are small caterpillars in the larval stage, derived from eggs laid by rather pretty, though small moths. These little moths live through the winter and come out in spring just as soon as the strawberry plants themselves begin to grow. They lay their eggs almost anywhere on the leaves, and very soon afterwards comes a small green caterpillar, which at once folds up a leaf or leaflet.

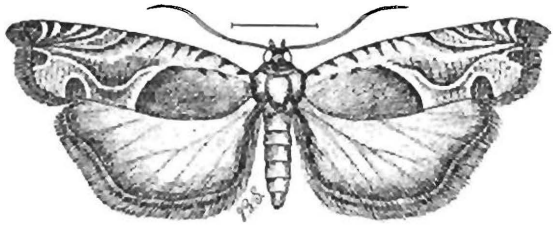


Fig. 18.

Phoxopteris comptana, moth of strawberry leaf roller, enlarged. Original.

As a rule, the leaflet is folded in the middle; the caterpillar gets there before it is entirely expanded, rests upon the midrib, and by

means of silken threads prevents it from expanding, or even folds it up again after it has in great part opened. Often leaves of considerable size are taken by even small larvæ and occasionally a whole bundle is spun up by two or more caterpillars.

The insects feed in such a way as to kill the leaf; that is, they do not actually eat all the leaf tissue, but eat through the veins or along their course, so as to destroy the source of nourishment, that it

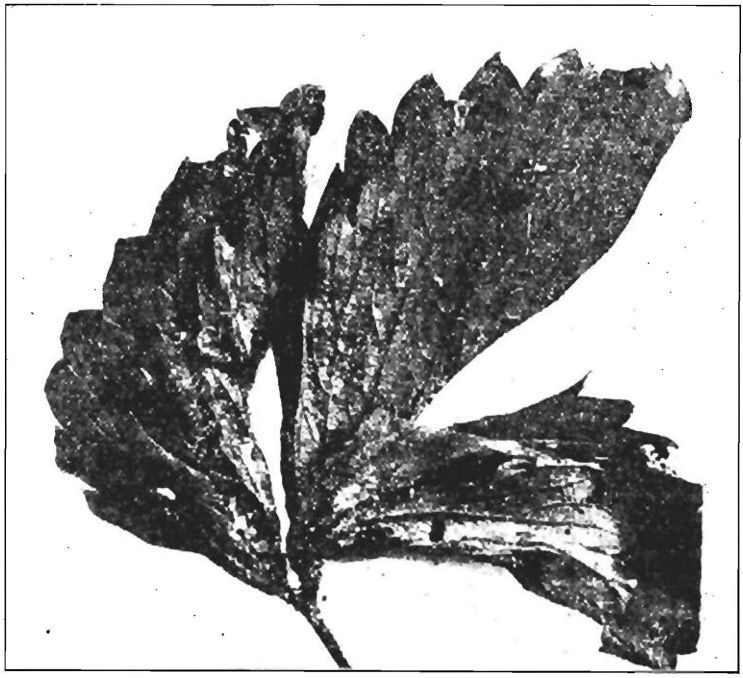


Fig. 19.

Strawberry leaves webbed up by leaf rollers. From original photograph.

becomes dry and brown. Where the creatures are abundant so many of the leaves die that the entire plant is ruined. Young plants are especially susceptible, and even on old ones the growth is stunted or they may be entirely ruined.

In July a second brood makes its appearance, and during 1897 this was so abundant that it spread from the strawberry plants, which were not sufficient to support it, to blackberry and raspberry bushes which were grown near by. On these plants it did much

less injury, but usually spun up the young leaves, in some cases eating out the heart and checking growth in that way. This is an old pest, which has done considerable injury in the past in other localities; but we can never tell from one season to the other whether the thing will be abundant or not. I have found it in this State wherever strawberries are grown, and, indeed, quite as often on blackberries and raspberries. It has been somewhat troublesome at times in Atlantic county in the blackberry districts, but is rarely numerous more than one or two seasons in succession. All insects of this general character are difficult to deal with, because of their habit of feeding in concealment. We cannot reach them after the leaves have been once spun up, and our only protective measure is to watch closely early in the season, and as soon as they are noted spray with Bordeaux mixture and Paris green. It is one of those cases where watchfulness is necessary, and where prompt application must be made just as soon as even an indication of the enemy is noticed. It will not do to wait and see whether there will be enough to do any real injury. We must take it for granted that there will be unless application is made.

Strawberries have also suffered some from root lice and other underground pests; but as no particular investigations were made on those points no practical recommendations can be suggested.

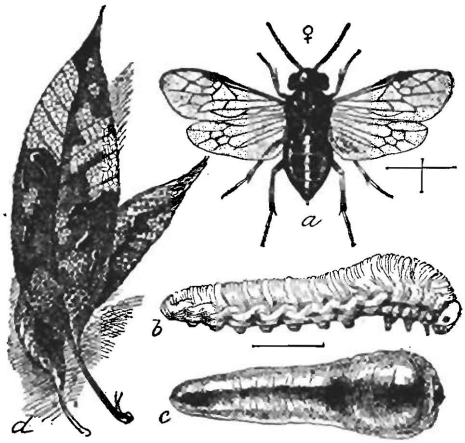


Fig. 20.

Pear saw fly: *a*, adult; *b*, larva or slug, from side; *c*, same from above; *d*, injured leaves; *a*, *b*, *c*, enlarged. (From Div. Ent., U. S. Dept. Agri.)

Saw flies have found the season of 1897 much to their liking, and their larvæ are what the average fruit-grower calls slugs. Pear and cherry trees, particularly young stock, have suffered, and late in the season, in many cases, the leaves were so injured that they dropped before their time, preventing the proper maturing of the wood. The parents of these saw flies are little black creatures with four transparent wings, that come out early in the

spring, almost as soon as the leaves themselves start. They fly about sluggishly and are often seen moving slowly up and down on the twigs and branches of such trees as they attack, and they begin almost immediately the work of laying their eggs. Now, the reason that these insects are called saw flies is because the females are furnished with a saw-like ovipositor, that enables them to cut slits in the tissue into which the eggs themselves are laid. These slits of course vary, and sometimes they are made in the veins and sometimes in the leaf. The pear slug makes a little pocket in the leaf itself, and there lays its egg, from which, in a very few days, the slug or larva hatches. The early brood usually does little damage; but about midsummer or the early fall the insects get so plentiful that they often render trees unsightly.

The pear slugs, and indeed all saw fly larvæ, are easily controlled; the spiracles or breathing pores are so slightly protected that almost any fine, dry powder is sufficient to kill them. Everybody knows, or should know, how to deal with the currant worm, and I need only to say that almost all saw fly larvæ can be dealt with in the same general way.

Among our shade trees there is none that is more pleasing to me personally than the tulip tree, or tulip poplar, as it is usually called. It makes a fine tree, the foliage is very handsome and the flowers are attractive, although they constitute an objection to its use as a shade tree. Ordinarily it is free from insect attack, but there is one very ugly scale that gets upon it, makes it unsightly and injures it seriously. It is called the tulip soft scale, and is the largest of this general character that occurs in New Jersey. It is a gray, slimy, soft creature, closely attached to the twigs and branches, and sometimes so densely that the twig looks knobbed or rough, with no part of the bark itself actually visible. The worst of it is that from this creature there is given off a liquid honey-dew, which, dropping upon the leaves and other branches, forms a coating upon which a dirty, black fungus occurs. This in turn becomes injurious by clogging up the pores and killing the leaves. The scales become full grown in the latter part of the season, and early in September will be found beneath them dozens, and in some cases hundreds, of little black larvæ that emerge from beneath the mother and set just as densely as they possibly can upon the twigs and branches near by. Besides the larvæ that we find under the scales at this time, we may also see small, red-

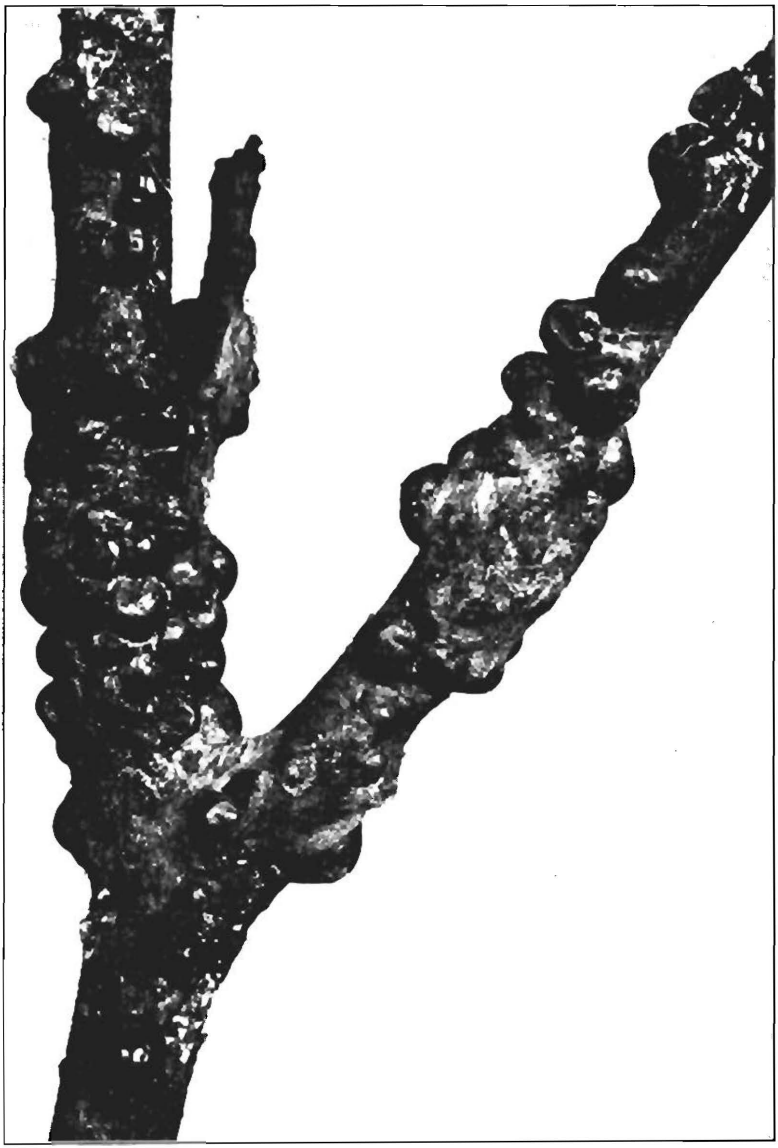


Fig. 21.

The tulip soft scale, *Liriodendron tulipiferæ*, showing the scales webbed up by larvæ of *Lætilia coccidivora*. From an original photograph.

dish caterpillars, and these are predatory in their nature and feed upon the young scale insects. In the branch pictured almost every scale had one of these little caterpillars beneath it, which were busily engaged in feeding upon the young. Unfortunately the young are born much faster than the caterpillars are able to feed upon them; therefore, in spite of the fact that probably half of the young were eaten up, a sufficient number escaped to provide for a new crop.

This matter is interesting, because it gives me an opportunity to call attention to the fact that even caterpillars are sometimes beneficial—not often, indeed, but enough to redeem them from the charge of universal depravity.

The parent of these caterpillars is a small moth—an inconspicuous creature that would hardly be noticed ordinarily—and it lays its eggs among the scales on which the larva afterward feeds. How many broods of this moth there may be in the course of the year it is difficult to say. I know that in September all stages of the insect could be found on the trees and that in the laboratory I kept breeding moths until December. Probably this does not happen in nature, and more than likely when the trees and scales become dormant the caterpillars also stop growing, and pass the winter in the larval or pupal stage, ready to recommence work in spring.

There is just one more subject to which I will call attention to-night, and that is Paris green, which has become an indispensable material on the farm. Complaints have been abundant for some years past that Paris green did not act right. Sometimes men have used it at a given strength, and the foliage or plant has been seriously injured. Again, used at the same strength, nothing was hurt, neither the foliage nor the insects. So many complaints of this kind were made during the early summer of 1897 that I was led to secure samples of the poison as sold in different parts of the State. Of these samples, which were purchased in open market, one or two of each maker were selected for analysis, and it turns out that there may be as much as twenty-five per cent. difference between different samples made by the same firm. That is, there may be twenty-five per cent. more arsenic in one sample than there is in another, and this, too, when the Paris green is unadulterated. In other words, the present methods of manufacture are such that the Paris green turned out is not uniform. Now, we see at once that twenty-five per cent. difference in the amount of arsenic is altogether too much for insecti-

cide purposes. It may not make any difference in the paint, but it certainly does in the insecticide. One lot can be used effectively at the rate of one pound in 150 gallons of water, and will even scorch the foliage. The other pound used in the same proportion would be entirely harmless to the plant, and to the insects as well. This is another of the difficulties that we have to deal with, and really I do not see how it is to be remedied just at present. The manufacturers claim that some difference is unavoidable, but they will not admit that as much as twenty-five per cent. is usual in their product. As a consequence of this difference in composition in Paris green, I am strongly inclined to urge the use of arsenate of lead, made according to the formula supplied by the Station. This may be made up of the crude materials by the farmer himself as needed, and the amount of arsenic in any given batch is always the same.

Taken in its entirety, the season of 1897 offered as strong a contrast, entomologically, as was possible to the two years immediately preceding.

As to the season of 1898, if anyone can tell me what the weather will be, I will venture some prediction as to the kinds of insects from which farmers will be apt to suffer.

Mr. Beans—Are not some varieties of apples more likely to be attacked than others?

Prof. Smith—Yes, sir. We cannot tell why, however, but it is a fact that one variety of tree is more subject to attack than another variety of tree in the same orchard.

Mr. Heritage—Does the San José scale attack all varieties of fruit trees?

Prof. Smith—I know of no exception. It also attacks most of the small fruits themselves. It attacks all the plants of the order Rosacea, and a great variety of other plants. It would be easier to make a list of those it does not attack than of those it does.

Mr. Bodine—It attacks forest plants also, I believe.

Prof. Smith—Yes, sir; it has been found on the oak, chestnut, maple and other trees. There is reason to believe it has spread throughout the scrub land in Burlington county, and probably considerably south of that.

Mr. Haines—Is the apple borer and the peach borer the same insect?

Prof. Smith—No, sir; they are a very different insect. The peach borer matures in one year, while the other requires three years. The apple borer makes tunnels into the solid wood, while the peach borer does not.

Mr. Haines—Is the strawberry leaf insect the same as that which comes on the grape vine?

Prof. Smith—No, sir; it is a different insect. It does not do much injury as a rule, because it spins above the blossoms, and although it may be an injury to the tip of the shoot, it generally blossoms just the same, and another tip will start out below.

Mr. Clifford—Can you give us any remedy for the black wire worm?

Prof. Smith—No, sir; they always require a certain amount of moisture for their life, as they are mostly found attacking the plant under the surface. The only thing I can suggest is to take a little straw or hay, in the shape of a mulch, to keep the ground dry at the surface.

A Member—We noticed this year very few potato beetles after the rains. Can you explain this?

Prof. Smith—There are all sorts of conflicting reports out about the potato beetle; some think there were more before the rains and some think there were fewer, but there was no general reduction that I know of.

Mr. Rice—Is it not possible to have some standard of purity for Paris green?

Prof. Smith—It seems a difficult matter. I have corresponded with a number of the manufacturers, and suggested to them twenty-five per cent. was too great difference, and they have replied that it is impossible to get it uniform. They always expect some variation, but not that much, but claim it is impossible to make a certain standard product. They were willing to guarantee a certain percentage in their product, but they would not say how much more.

A Member—The difference must be in the method of compounding.

Prof. Smith—I am not familiar with the mechanical process, and cannot say what causes the difference. I think much of the difference is caused by the effort to get something that can be sold cheaply. That has been suggested in my correspondence with the manufacturers, and they claim that the price at which the material is sold will not permit the exercise of the necessary care in manufacturing.

They claim it must be rushed through in order to get it out at the prices at which it is now being sold. They say there is no profit in it anyhow.

A Member—The farmers are suffering a great loss from poor Paris green. One season a certain quantity is used and it works all right, and next season the same quantity is used and it makes an utter failure, or it destroys his crop. Something should be done to secure a uniform product, and not compel the farmer to go through a disastrous experiment every year or so. He should get this product so that he could know to a certainty just what it will do every year.

Prof. Smith—I do not see how you can overcome this, unless you can induce the manufacturers to put out a certain special brand, giving the percentages of each lot manufactured. If they do that you will have a safe guide. The inequality of Paris green is responsible for the bad results had from spraying with Paris green, in many cases.

MODERN DEMANDS IN SUCCESSFUL DAIRYING.

BY W. D. HOARD, EX-GOVERNOR OF WISCONSIN.

MODERN DEMANDS IN SUCCESSFUL DAIRYING.

Ladies and Gentlemen—The topic assigned to me by your Secretary is a great deal bigger than I am, and I fit in the place much like a square pin in a round hole, touching only at the corners. [Laughter.]

The necessities of modern dairying is a very great question, hardly comprehended even by many of the most sagacious of our farmers, and not at all by the great mass of men engaged in handling the dairy cow.

All of the principles of agriculture are as old as the earth, but our knowledge of these principles is a thing of to-day. We ought to know more of these laws and principles than our fathers did, and if we do not, both they and we have lived in vain.

To-day is modern; yesterday is ancient. We have the fullest respect for yesterday, and the knowledge of yesterday, so far as we can make use of it to-day. The necessities that confront us are of to-day, essentially modern; therefore the knowledge and skill that are to meet them must fit, must be modern. Tradition is ancient conviction. It may be right, it may be wrong for you. You cannot tell until you see if it will fit the necessities of the day. Every demand that is made by society on the dairy farmer is modern, and it is growing more so every day. The competition of these modern days in every line of human effort is merciless. Darwin's statement of the law of the "Survival of the Fittest" never had greater exemplification than to-day in our modern business and industrial affairs. The dairy farmer cannot escape it; he must face it, make the best of it and his fortune, or down he goes.

Problems which our fathers and grandfathers never thought of meeting are confronting the modern dairy farmer, as well as the merchant, the manufacturer, the business man, the toiler—all are confronted by this modern demand. New modes of handling our business have arisen, brought about by the many changes is living,

the increased expenses, the decreased prices. All these must be confronted by the toilers in every branch of modern industry, and the dairy farmer has not escaped his share of these problems. He must make the best of it and fight it out.

I have been in every State in the Union, with one exception, and these problems confront the dairy farmer of New Jersey, just as they do those of other States. These new, these modern, conditions must be met and met intelligently, if you would succeed in dairy-farming. I have found, I think, the greatest difficulty with us lies in the almost universal misapprehension of the truth.

Let me allude here to what I believe are some of the mistakes of to-day from a New Jersey standpoint:

First. It is a mistake to think that this problem of modern dairying can be successfully solved simply with one's own farm experience, and that the New Jersey farmer does not need a knowledge of the experience of dairymen in other States and in other communities in his own State. The worst thing for a dairyman to do is to shut himself away from the experience of other men; or, as St. Paul puts it, "measure himself by himself." It takes a big man to do that. [Laughter.] There is not sufficient reciprocity of knowledge, not sufficient exchange of experience, not a sufficient understanding of the multifarious aspects of this business problem. It is like a kaleidoscope—no one turn shows the same as another. Many of you think the dairying questions are alike, while, as a matter of fact, no cow ever gave the same butter-fat content in her milk every day, and never will. God has made every man different and every cow different, although the underlying principles that govern each are much alike. The very worst thing the dairyman can do is to shut himself away from the experience of other men—let me repeat it; yet there are many men who think they cannot learn from others, and many others do not wish to impart knowledge.

Second. It is a serious mistake for the dairy farmer of any State or locality to get into the way of thinking that dairying on his farm or in his community or State is something materially different from the same business in other States. This is not true. Unfortunately, it is a widely-entertained notion, for you can go into any State and you will find plenty of farmers who reject dairy literature from other States, on the ground that it is not adapted to their locality. This is narrow provincialism, and it has no foundation in fact. The

problems of breeding, feeding, stabling, making of butter and cheese and selling the product are almost the same all over this great continent of ours. What is the best judgment, the best experience, the best practice everywhere is valuable instruction everywhere. No man can afford to keep cows and remain ignorant of modern dairy literature. In soil management alone is the question a local one, but here even it is not entirely so, and the machinery we use on the farm is much alike everywhere.

The first necessity that confronts the dairyman is that he must keep posted, *keep posted*, KEEP POSTED. The man who will not spend a little money for his own enlightenment every year is saving at the spigot and wasting at the bung-hole. This may be clearly seen in the fortunes of the vast number of dairymen who keep cows and make no profit on them. A well-posted dairyman going onto their farms can see by a look at their cows the way they handle them, their methods of feeding and caring for their stock, and all the details of the dairy farm, that they are largely ignorant of the wisest and best methods of doing their work. How can they be expected to keep well posted? They do not travel about visiting other herds, they do not attend dairy meetings or conventions, where dairy methods and necessities are discussed, and they do not read dairy literature. Here and there in every dairy community you will find one, or maybe two or three, who hunger and thirst after knowledge, and these are the first to note any improvement, and quick to take advantage of it. They keep their minds constantly imbued with the best and truest thought of the day on this question. They keep posted on the saving as well as on the making of money, and when the black pepsin swindler or the creamery shark comes in the neighborhood they have read of him, while the "foolish pass on and are punished." [Laughter.]

The great overshadowing necessity of the hour is, how to stir this great mass into life, into more mental activity, get them to read and think more, have sounder ideas of the dairy cow, how to produce her, and how to make a better profit with her.

You can see the importance of this when I tell you that of the 800 farmers who bring milk to the Hoard Creameries in Wisconsin there is a difference of over 100 per cent. in the gross cash return per cow in different herds, and over 600 per cent. difference in the net profit per cow.

For instance, one man getting from $65 to $75 per cow, annual cash return, besides the skim-milk, the other getting but $35 per cow during the same period. The first man got $30 per cow net profit, above the cost of feeding, the other getting but $5 per cow. You see one receiving six times as much profit as the other, and therefore 600 per cent. more of net profit in the first case mentioned, as compared with the second. The first man is a student and a reader, and has learned how to produce a profitable cow, and how to manage her. The last man does not read and constantly sneers at "book-farming," as he calls it, and ridicules what his neighbors tell him they saw in their dairy papers. Understand, the butter from these two herds sold, for the entire year, at the same price, the difference being entirely in the amount produced. It was not the market end of the proposition, but the end with the man on it. [Laughter.] And let me add right here, there are thousands who get even less than $35 per cow of gross return.

This idea that it is the market price of the milk seems to be widely disseminated, and all your failures to make money out of dairying are attributed to the market end. The question with most dairymen seems to be, "What am I going to get for my milk?" The farmers' end of the proposition, which governs the question of profit, in the quantity and quality of the product, seems to be absolutely without intelligent understanding. You cannot change the price one hair, no matter how you fight, so you must look elsewhere for the cause of your lack of profit. There is where the profit lies; there is where the money is—in the farm end of the proposition, in the cost of the milk, or the butter, or the cheese, for its production. Of the two men I have mentioned one receives $30 per cow above the net cost of production of his butter, while the other receives but $5 per cow. Fancy how much less per pound it costs to produce butter from the $30 cow than from the cow which nets her owner but $5. The sentence of Christ is right—"Unto him who hath shall be given, and unto him who hath not shall be taken away even that which he hath."

The second necessity is, stop this makeshift, wasteful dairying with the "general purpose," half-beef and half-milk cow. No matter whether you are producing milk for the city trade, or the creamery, or the cheese factory, you cannot afford to feed for milk and have a large portion of your costly feed diverted to the making of cheap cow beef. It is the man who believes in keeping posted that has

been keeping tab on such cows. He finds that before he is through with them they bring him in debt. I have been amazed to see the number of farmers who do not know whether they are making a profit or not in the milk business. I cannot understand it, and at the same time believe these men to be intelligent dairymen. All they seem to know is that they come out at the end of the year "just about even," as they put it. When I suggest a business-like analysis of the cow, and of their feeding methods, to see where the leak is, they lose all further interest. Once in a while they say, "Oh, that is some more of your dairy-paper farming." [Laughter.] They make me think of the woman who bought shot for a shilling a pound and sold it for ten cents. When she was asked how she could do it, she said she knew there was not much money in it, but that by selling a large amount she made it pay. [Laughter.] They want to be known as big dairymen, at whatever cost. I have known lots of men whom it was impossible to get to reduce their herds to a paying basis, because it is such a delightful sensation to be able to boast they are keeping a herd of thirty or fifty cows, even if one-half these cows are robbing them of the profit of the other half. They want to be able to say, "I am keeping fifty cows this year." Oh, this conceit! Man's conceit is a very expensive institution to maintain. [Laughter.]

I believe that one great cause of the loss of profit lies in the fact that more than half of the cows are unfit for the business. No man on earth could make any money out of them unless he received an unreasonable price for their milk. The problem of to-day is how to make money and sell good milk at a low price. There is where the good cows come in. One man said to me, "But there are not enough good cows to be had to supply the trade. If I kept only the cows that really paid I would not be able to produce as much milk." I looked at the man in amazement, and I tell you, gentlemen, there are thousands just like him. [Laughter.] "Why," I said to him, "what are you running your dairy for—to make milk or to make a profit? Of what interest can it be to you to produce milk at a loss, in order to produce more milk? Can you not see, as a business proposition, that you had better keep half the number of cows and make a profit, rather than double the number at a loss?"

Gentlemen, I cannot understand it. If there is a man on God's earth who hunts an honest dollar to its last end, it is I. [Laughter.] Not so much that I care about the dollar [laughter] but I hate

most mightily to be beat. [Laughter.] I hate to swindle myself, for there is no forgiveness for that.

Here comes the great problem which so many dairymen fail to comprehend, that of making money by reducing the cost of production. Their eyes are set on the market end—the price they are going to get—when there is not a man among them that can change the price one iota. Where they are king, if they only knew it, is at the producing end of the string. The poor cow that was bred without a purpose, the "general-purpose" cow, that takes your feed for milk, and gives you cheap cow beef for it, that cow, and the inability of her owner to see the truth, is what stands in the way of profitable dairying. You cow-owners of New Jersey would have practically no competition, and you would be paid good prices if the milk-supply came only from cows that paid a profit on their keep. It is the poor cows, owned by men who have poor ideas, and work for starvation returns, that overload the milk market, the butter market, and the cheese market. Let me repeat, that if you cow-owners of New Jersey would take your milk-supply only from cows that paid a profit you would have practically no competition, and you would receive good prices for your milk. Remember this, take it home with you and think it over. The poor cow is of no use to you. The poor we have with us always. [Laughter.] I am not here to choose between God's works, and Scripture applies to everything God has made. Some one has said I was irreligious, sacrilegious, in quoting Scripture in this way, but if I cannot make practical use of the Bible for my instruction and understanding, it is my candid opinion it is not the fault of the Bible, but mine.

Another great reason why there is so much milk forced on the market is because there are so few farmers who have clear ideas of the value of skim-milk and the profit of pig and calf-raising. In central New York there is not one good pig and calf raised where, forty years ago, there were ten. Thousands of farmers have gone into milk-shipping to New York, with the same poor ideas of cow and farm management that they have always had. Of course, I don't mean to say that when I left New York everything good went with me [laughter], or that all knowledge left there when I did, but I do say that in my native town there are far less calves raised, and vastly less of intelligent understanding of the art, than there was forty years ago.

Shipping milk is very destructive to farm fertility, just the same as cheese-making, unless special effort is made to keep up fertility. There is but little young stock raised, and the farm is carrying not more than a third or a half the stock it should to maintain its productive power. He is growing poor indeed who impoverishes his farm. There is no substantial reason why the New York or New Jersey dairy farmer should not produce as much pork or veal per farm as in Wisconsin. Here is where the skim-milk puts in its work. The silo comes in to help, more and more stock is kept to the acre, plenty of manure and clover makes the farm richer every day. Did you ever see the price of land decline very materially where the fertility of the soil was kept up?

No man is a good citizen who decreases the wealth of his State. This cutting down the wealth of the State is becoming a very serious question for statesmen to contend with.

I would have the New Jersey milk dairymen wiser unto their own salvation. I would have them beat the milk trust and the dishonest middlemen, by a rigid weeding out of their herds. That will reduce at once the quantity of unprofitable milk. I would have them turn their faces and forces at once towards the production of their own cows, keeping less cows and better ones. I would have them provide for themselves a "whip row," in the form of more creameries, sending part of the milk to market and part of it to the creamery. I would have them organize co-operative creameries, and a Farmers' Club at every milk-shipping station, where they could meet and discuss these problems, co-operate in buying their feed, form a premium fund from which prizes could be awarded to the herd showing the greatest profit, at an annual meeting, to close with a royal New Jersey banquet. [Laughter.] In short, I would have them as wise on the farm, and in co-operation with each other, as are the farm peasants of France, Denmark and many other parts of Europe, saying nothing of many parts of the West.

I was much edified a few years since by a visit I made to the Canadian Provinces, by the philosophy of English life and English agriculture. The Englishman is wonderfully wise in the promotion of the agricultural idea, and whenever they have a meeting of the Farmers' Club, or any meeting of farmers, they have a feed together. You must build up the agricultural sense in the community. The

Englishman is wise in this, and I would have the New Jersey farmer just as wise in this respect.

Now, as to the feed question. It used to be a common remark among men who kept cows for the city milk trade, "What I am after is quantity; I am not making butter or cheese."

But that idea no longer applies in the sense it used to. The demand of the city consumer is growing louder every day for healthy milk, pure milk, and milk richer in solids. The legislation of cities is rapidly following this demand in obedience to such public sentiment. Like all other merchants and manufacturers the farmer must cater to his trade. So, the butter, cheese and milk dairymen are fast getting on a common footing in the necessities of their production.

I want this point followed closely, for it is of the utmost importance. I am like a woman; I dislike very much not to have the attention of my lover when I am talking. [Laughter.] A woman is very impatient about being courted, and no one blames her, either. [Laughter.]

I want to repeat that the city consumers are demanding a better quality of milk, one richer in solids, and legislation is being framed to meet this demand. You and I have never seen so much legislation as has been enacted in the past two years. Like other merchants, the farmer must cater to meet this demand—he must cater to his trade.

The science of feeding—and there is a science of feeding—is not an exact science, because the cow, and the man who feeds her, vary so much. But follow this view of the case for a moment. You all know from your own experience that there is no food that will make a cow give as much milk as the juicy, rich, blue-grass pasture in June, before the heat and flies come. You know this is true with cows in all stages of lactation.

Three things evidently govern outside of the cow—succulent, rich and tender grass in abundance, just the right stage of heat and absence of the torment of flies. If you were called upon to make the ideal food and condition for a cow, could you beat it? No. Take these points and set them up as a guide in your subsequent treatment of your cows.

What makes this grass so productive of milk and milk solids? Its ratio of protein or muscle-making elements to carbohydrates or heat and fat-making elements is one to four and one-half. It is well

to remember that fact. Another thing to remember about the grass is that it is tender, full of juicy succulence, easy and quick of digestion. Third, it is abundant; the cow does not have to travel far for it; she can quickly eat her fill and lie down. She is not wasting half her energy and food in hunting for more food. Exercise of this character decreases the flow of milk. In this ideal June pasture the answer in milk is prompt and flush for the reasons given. It is the best pasture for this reason.

A cow will crop about eighty pounds of two and one-half inch grass per day, and a good cow, on this, will produce from one to two pounds of butter per day. Dry that grass and it will weigh from fifteen to twenty pounds. Feed that dried grass and give her all the water she will drink, and down will go the milk and butter yield. I have tried this repeatedly. What have you lost in the process? Evidently something more than water.

What is the lesson and its answer? Cut the hay when it has plenty of succulence and before the seed forms. Cut it twice in the season if you want more hay. Provide other succulent food, like ensilage. Do what you can to guard against the discomfort of the cow from either heat or cold or the annoyance of flies. Give the cows as near June conditions, summer and winter, as you can, with sufficient food of a succulent nature, sufficient protein and bodily comfort, and you will have done your part. Then the situation is cleared one-half, at least, and the problem remains with the cow and not with you.

Everywhere I go, from the Pacific to the Atlantic coast, I find these simple principles greatly misunderstood and ignored in the daily practice of dairymen. Men who keep the largest herds, and have been farmers all their lives, will cut ripe, woody hay, because, as they say, "it will go further." Well, brush and three-year-old straw will go further yet. [Laughter.]

A great point lies in the breeding of the dairy cow. Three leading principles should govern the thought and action of every man who sets the forces of life at work to produce a good cow:

First. Capacity for production.

Second. Economy of production.

Third. Endurance in production.

We must strive to unite these three in one cow. Many cows have but one, and lack the other two. We have set our mark, let us say,

for 300 pounds of butter per cow annually, that is our measure of capacity. By breeding to the best, which in turn has come from the best, in long lines on both sides, we can easily reach capacity. Then comes the study at the feed manger, to note whether economy of production is the rule. Some cows produce a great deal more from a given amount of food than others. They are better economizers, and therefore they yield more profit. Find them out by keeping a record of feed and yield, and never sell such cows.

I was taught a lesson some time ago in watching a stamp-mill at work in Colorado. I noticed the tremendous expenditure of force and of money, and all for what?—the noise was deafening, and the energy tremendous. It was crushing gold quartz. I noticed that every penny of expense, and every pound of force, and every bit of energy, and all the noise was made in crushing the rock that nobody wanted, and not on the gold that everybody wanted. Then I thought to myself that the errors of judgment cost a man a thousand times more than the truth. [Applause.] So it is in the work of the dairy and all through life. A man's errors in judgment cost him a confounded sight more than the truth. [Laughter.] The gold doesn't cost a penny; it is the enclosure, the husk, that costs so much—that which nobody wants.

Lastly comes endurance in well doing—such a cow as the race-horse men say is a "stayer." This is the true idea and definition of "cow constitution." The question of constitution or endurance, in every animal, must be judged by the function of that animal. The function of the cow is milk-giving; one that takes her feed well, does not lose appetite, resists disease and discouragement (though you have no business to provide her with discouragement), and does three hundred days' work at the pail year after year. Are there any physical indications of this constitution? Yes, in the construction of the navel and the walls of the abdomen. If the navel is full and pendent, the walls of the abdomen strong and thick, the backbone prominent with rugged processes, she is a cow that endures well a large degree of production, if she has the capacity. Any man of ordinary intelligence, if he keeps these three principles—capacity, economy and endurance—steadily in mind, can easily double the production of his herd by intelligent breeding and wise feeding in eight years.

In dealing with these forces let us ever keep in mind two things—our own growth in knowledge, and the kind of cows we wish to pro-

duce. If we did this what men and cows we would have in a few years! [Laughter.]

Food adulteration. It is a matter of the utmost importance that farmers and consumers should unite in a vigorous demand for the strictest sort of legislation, and in the enforcement of such legislation, against all kinds of food adulteration.

The consumer is interested because he is being constantly swindled into paying, for instance, a butter price for oleomargarine, a milk price for watered milk, a pepper price for buckwheat hulls and pepper, and so on, through the category. He has even a selfish interest in stopping adulteration that ought to make him bestir himself.

The farmer is interested, because he is the only rightful producer of food. Food and clothing must, primarily, come from the soil, and any man who steps in between the soil and the consumer is the maker of an imitation; an imitation is a counterfeit, and a counterfeit is a fraud *per se*, having no rights in conscience, political economy or law, as against an honest product. [Applause.]

To say nothing of the right or wrong of it, or the repulsiveness of a fraud, if the farmer has good, common, business sense, he will demand legislation against all kinds of food adulteration. Every pound of water that goes into the milk from the dishonest dealer robs the farmer of the sale of a pound of honest milk, and lessens the desire and corrupts the taste of the consumer for good milk. Every pound of oleomargarine acts in the same way.

What shall the farmer do? He should uphold and demand hostile legislation against such fraud in every city, in every State, and in Congress. How can he make himself effective? If every farmer in New Jersey would buy ten postal cards and expend them in writing to his Member of the Assembly, State Senator, Member of Congress and United States Senators, asking for such laws, he would see something done very soon. You put the business of law-making into the hands of politicians. Plenty of them are venal and corrupt; they take money from food adulterators to prevent legislation. But you stand up, as I have indicated, all over New Jersey, and they will do your bidding. That was the way the National Dairy Union and its State auxiliary passed the Anti-color law against oleomargarine, in Illinois, last year. We made a postal-card campaign of it, and, though oleomargarine money flowed like water, the Legislature came

to time, and by the same influence the Governor signed the bill. Stand up and make politics for yourselves once in a while. [Applause.]

Ten postal cards from each farmer in the State, or even less, will do this.

In 1886 the National Butter and Cheese Association met in Chicago, and a very important body it was. The Committee on Legislation brought in a resolution, a sort of milk-and-water affair, asking Congress to do something for them. I moved to amend the report, and add these words: "And we demand of Congress it do something" [applause], and then the fun began. [Laughter.] We debated the matter all day, and we carried the point. Mr. Wanamaker said to me one day, "Oleomargarine has come to stay." One of the oleomargarine people said to me, "What will you do about it? we have the money and the organization." I said I did not care about the money, that that was offensive to start with. "You may have the money and the organization," I said, "but when the old farmer has sat down and whittled this question out, he will, in due time, inform you what he will do about it." [Applause and laughter.] I came home and wrote a little paragraph, short and to the point, and at the head of it I placed these words: "Write your member of Congress a postal card." I put it in the paper, and made it as plain as possible, and I sent the paper to other papers in the United States, and they copied it, and Congress was absolutely snowed under with postal cards. [Laughter.] My own member of Congress wrote me, "For God's sake let up; I have a bushel and a half of postal cards, and I am all right, and you know it." [Laughter.] That was the foundation of the present Oleomargarine law. Last winter we pursued the same tactics, and I, being President of the National Dairy Union, had to do all I could. We flooded Congress with postal cards, and we passed the Cheese bill. I went to Washington and spent about two weeks, and I want to say that this talk about buying Congressmen is all wrong. He cannot be bought if his constituents stand behind him. He is more likely to be sold out by the indifference of his constituents. The people who are interested work hard for the legislation they desire, and the Congressman thinks you are not interested, and away he goes. You put the making of the laws in the hands of the politicians, and interested parties spend money to prevent legislation. Stand up, as I have indicated, and they will do your bidding. That is the way we passed the Anti-color law in Illinois, although the oleo-

margarine money flowed like water. It is said that over $100,000 was expended in trying to stop the passage of the bill, but the voices of the people were unmistakably behind the bill, and it was pushed through, and the Governor signed the bill under the same influence. Make politicians of yourselves, once in awhile. [Applause.]

A word to you here in New Jersey; it is this—You ought to form in this State an Auxiliary Dairy Union. The object of the National Dairy Union is simply this, to see that such laws as are in the interest of the dairymen are passed, especially with regard to adulteration of food.

This union is taking first the dairy situation, and is endeavoring to have such laws passed as will prevent the adulteration of milk and dairy products. Its officers serve without pay. When it is through with the dairy interests along this line it will take hold of other lines of food products. Every penny paid into the union is expended legitimately in arousing the people, and this is legitimate political work. Three thousand dollars were expended in Illinois last year to arouse the people, and it is surprising what an active work can be done by a body of this kind in securing the passage of a bill like the Anti-color bill. Why, there were lots of members clearly in the interest of the bill as soon as they "heard from Hanna." [Laughter.]

But my time is short, and I must leave this part of the question with the recommendation that you form an Auxiliary Union in your State.

Is it the cow or her food? This is another question, and it is a question of many sides.

One of the most prevalent and conspicuous misunderstandings concerning the whole dairy question consists in estimating the food of greater importance than the cow. Here is the secret of the long-continued low average of the cows of the country and the slow progress they have made from 1,500 pounds per cow yearly in 1850 to only 2,795 pounds in 1890.

The great mass of farmers cling stubbornly to the notion that it is the feed which governs the product, and not the cow it is fed to. If they thought otherwise you would see at once a grand effort to breed better cows. You can't fool the horseman that way; then why should the cowmen allow themselves to be misled in this way? While attending a convention in a Northern State I spoke earnestly on this question. A hard-headed, stubborn old farmer arose and said

I was all wrong. "Talk about your breed," said he, "I tell you the breed is in the corn-crib." A nod of approval went around among the farmers, as though to say, "The old man is right," and yet I knew he was wrong, misleading himself and others. It was only a half truth he stated. I thanked him for his information and answered him as follows: "I have been a hard student on this question of breed for many years, and I am glad to find a man at last who has a short cut. Won't you tell me, my friend, how to feed a razor-backed hog so as to make a Poland China out of him? [Laughter.] How would you feed a race-horse and make a draft-horse out of him? How would you feed a Jersey and make a Shorthorn if results are all due to feed and not to breed? In Wisconsin we once had a little horse by the name of 'J. I. C.,' weight less than 1,000 pounds, that could trot a mile in two minutes and ten seconds on twelve quarts of oats. That was the speed product of twelve quarts of oats when fed to 'J. I. C.' Now, I will almost guarantee, my friend, that you have horses that could not trot a mile in six minutes if you should run ten tons of oats through them. Is it all feed?" [Laughter and applause.]

Farmers everywhere must work up to a truer, better understanding of the value of breeding. They must study to breed in the capacity for performance, and then feed up to that capacity. Once let a farmer get that idea strongly in his mind, and you will quickly see a marked change in the productive capacity of his cows. Here is a simple illustration of what I mean: In my own town lives a retired dairy farmer, who ran along for years trying to make a good dairy profit with a herd of grade Shorthorn cows. His ideal of a dairy cow was the Shorthorn build. He kept buying bulls of that breed, but nowhere could he find one that would give him cows that were as profitable as he knew he ought to have. The best he could do with his herd was 150 pounds of butter a year per cow. If he undertook to crowd them a little further they commenced to fatten and shrink in milk. The dairy temperament in these cows was low, and overlaid with the beef of flesh-making temperament, and he was constantly breeding in more of it. Finally he made an abrupt change. He bought the best and most potent Jersey bull he could find, and put him at the head of his herd. The daughters of this bull, when they came into full production, averaged annually over 250 pounds of butter apiece, and the granddaughters, by himself, averaged over 300 pounds. He bred the

daughters to their own father, thus securing an inbred, three-quarter Jersey grade, which, when coupled with pure Jersey blood outside, scarcely one failed to produce profitable butter cows.

Then what is breeding? You hear men say they want the individual quality in the cow. It is individuality in a certain line, that is all. Individuality and breeding go hand in hand.

Directness of purpose is a great thing. Go for what you are after on the most direct lines you can get. It seems as though some men had everything in their minds, when breeding and selecting a cow, rather than the main thing. One says I want good size. Ask him if size is an indication of ability. The flea can jump two hundred times his own length; can you? [Laughter.] Another wants large bull-calves for veal, forgetting that he cannot make the male issue beefy without doing the same thing by the female issue. There are lots of men hunting for things they couldn't handle if they got them. [Laughter.]

A Georgia cracker and his wife and yaller dog stood in the door of their cabin watching as a locomotive came along for the first time. This was the first view they got of it. They watched it with fear and trembling, and the yaller dog had a ridge of hair from his neck to his tail standing right straight up. [Laughter.] And after the engine had passed, the dog started on a dead run after it, and then the cracker's wife said "Jim, do ye guess he'll ketch it?" Jim shook his head and said, "Blamed ef I know, and dog-goned ef I know what he'll do with it ef he does ketch it." [Laughter.]

We have one of the wisest old Germans I ever knew, old Theodore Lewis, who has thought further into the philosophy of the hog and the meaning of swine life, than any man on the American continent. He is very fair and very sincere, and a great seeker after the truth. In one of our meetings recently, while Theodore was seeking after the truth in regard to the hog, up jumps one of those smarties you will find in every community, thinking he would down that old man, as he was telling his story. He said, "How do you feed your hogs, ground or unground feed?" "Ground," said Theodore. "Wet or dry?" was the next question. "Dry," said Theodore. "There is where you are all wrong, sir," said this young exponent. "Ish dot so?" said Theodore. Being thus suddenly confronted with this statement he said, "Tell me the reason for it." He thought he might be wrong. "Any man with good sense, or who knows anything of hogs, and who

is not a fool, would know better than to feed it dry. It will take two hours for the hog to feed the dry meal," says Smartie. Theodore looked at him and said, "Vell, vot is a hog's time vert, anyhow?" [Applause.]

There was a man who was the type of thousands of farmers, trying to get rich by economizing on a hog's time. [Laughter.]

Thus it is with some farmers—selecting cows, and asking for this thing or that thing, which has nothing to do with the ultimate result—the larger profit to be derived, and forgetting the major part of the law.

These are some of the things we believe: We believe that the farmer should be honest with himself and with his cows, and with his farm; that he should defend the cow and himself against his ignorance, his prejudice and everything that will damage his own success.

That appeals to me as much as it does to you The mind of man is trying to conquer the secrets of nature. Never in man's history was there such mental activity for this conquest as now. The farmer must not hang back. Suppose thirty years ago the students of steam, electricity, mechanics, chemistry, or any other physical science had believed what many farmers show by their actions that they believe, viz., that there is nothing more to learn in their line, where would the world have been to-day? What the scientists have studied out, discovered, demonstrated, has been the triumph of mind first, then came the triumph of hands. How, then, can there be any advance in the profits of farming until we change the character of farming? How can we change the character until we can see what to do? How can we see what to do if we remain ignorant of the truth, and contented in that ignorance? How can we see the truth unless we go where it is, or allow it to come to us?

Raphael was asked to define art in a single sentence. He spent a month trying to get this into a single sentence, and he finally gave this as his reply, "Art consists in the ability to see." If the mind's eye cannot see the picture the hand can never paint it. That applies to you and to me in the simplest problems, even to ditch-digging. It applies everywhere where man is to guide the results by his own hand and thought. We must have the ability to see, and we cannot see unless we go where truth is, or allow it to come to us.

The great bar to agricultural progress and, mind you, to profit as

well, is that class of farmers who don't care to be anything else than "average farmers." What help are such men in the effort to make dairying more perfect and more profitable? There they stand, with their ideas at a low average, cows at a low average, and the farms growing lower in average fertility and value; young men of force and intelligence fleeing from the farm to find something to do that has an upward tendency, a spirit of progress in it. From Ohio, eastward, values in farm lands have declined in many districts from 40 to 75 per cent. in the last thirty years. New Jersey farmers know something about this. "Something is wrong," shouts the politician, and he asks you to vote for "free silver," or something else, with him "in it," as a remedy. I can buy farms in what was once the richest section of New York State for $25 to $40 an acre that once sold for $100 an acre and upwards. The same is true of New Jersey. What a destruction of individual and State wealth is here involved! There is one prominent cause for this—the passing of the American farmer. Not one farmer's son takes the farm from his father where there were ten to do this patriotic service thirty years ago. Go into any community where there is a generation of young men ready to hold up the honor and character of the old farm and you will not find such a state of things.

The West has been saved from this loss by the great influx of foreign farm peasantry, to take possession of the farms as fast as the American-born sons deserted them. The sons of these farm peasants are not anxious to enter the professions. They have not enough of our so-called "higher" education to unfit them for being farmers, or a practical success in anything else. Their ambition—and God bless them for it—is to own a farm, if possible, near the home farm, but a farm anyway. And so from these people there comes an upbuilding of the farming class in the West, a demand for farms, a consequent increase in the value of farm lands, a growth of fertility, particularly in the dairy districts, and a steady maintenance of the wealth and prosperity of the State.

As a partial remedy for the exodus of our sons from the farm, I would begin at the foundations of their education. I would have the primary principles of agriculture and of agricultural chemistry taught in every country school. [Applause.] I would have every farmer supply his home with the best agricultural literature. Early education is a powerful factor in determining the after-course of a

man in religion, politics and business. The only farmers' school, *per se*, is the district country school, the school where the farmer is the sole arbiter of his destiny. Supply these schools with the best agricultural literature, and ground the boys well into the understanding of the value of life on the farm. We have plenty of professional men. The world is full of them, but the farm suffers. The country is not suffering for better universities, colleges or academies, or for more and better-educated professional men. We are filled up and running over with this material. But the farm suffers, the farmer and his son suffer, and there comes a great loss to the State, because intelligent, practical farm education is at such a low ebb.

Give the farm boy a better chance to grow to his full stature *as a farmer;* give him a better chance to learn something of the science of his calling, not alone the drudgery of it. "As the twig is bent the tree is inclined." But I have talked long enough. [Cries of Go on, go on!]

Gov. Hoard—Well, I've got you down as the boy had the dog and may as well keep you there. John was pounding a dog that was dead, and a gentleman said to him, "What are you pounding the dog now, for? He is dead." "Yes," said John, "but I will teach him there is punishment even after death." [Laughter.]

A few more words and I am done. Remember in treating your cows, the intimate relationship between their sexual organs and their nervous systems. Breed for large nerve power, for that is the milking function—the function of motherhood The dehorning of the male is likely to result in a severe nervous shock and injure his potency as the sire of profitable cows, and it is my candid opinion that those men who have, in seeking greater safety, mutilated the males, will find they have been breeding down hill. It takes a long while to find this out sometimes. Horsemen have found that by docking the tails of their horses they have reduced the jumping power.

Now, as to my own experience. In this there are certain things I am particular about: First, the right sort of heredity; second, the right sort of handling from calfhood to motherhood, and third, liberal feeding. Be cautious not to create the flesh-making tendency in the heifer. Remember, there are two tracks here and the switch is a very acute angle. It is very easy to switch the animal down another track and to injure her as a milk-producer. We don't want her to make flesh too easily. Fourth, the right sort of environment. Here

let me refer to the summer silo, to bridge your cows over the dried-up herbage during July, August and September. The summer silo is the cheapest and easiest way to provide summer food. I would build it narrower than the winter silo, but just the same otherwise. With the narrower silo you can go deeper in feeding and thus insure sweet fodder. I have found that I could feed this summer ensilage without any noticeable loss of milk. Mr. Gurler makes twelve-cent milk for the Chicago market, and he tells me he considers the summer silo one of the most important adjuncts he has in reducing the cost of the milk. Neither does there seem to be any flavor from it. In my own experience I have satisfied myself that nearly all the flavors gathered by the milk come from unhealthy stables and unhealthy or uncleanly milkers. This is where most of the mischief comes from, as many of you must know.

As to the best-balanced ration: It is admitted that there is no feed in existence so productive of milk as the croppage of grass along in June, say two and one-half to three inches in height. This is a perfect food. Why? Because it contains just the right proportions of fat-forming and of milk or butter-fat constituents. Clover hay is the best thing until is commences to blossom—the best in the world. Milk itself is a perfectly-balanced food—that is, there is about the same proportion of protein and of heat-forming elements in it. The cow cannot produce milk without a certain proportion of protein, which is the curd or cheesy part of the milk. She cannot make the proteine out of heat-forming materials, but must have the right proportion of protein.

Some may think it is not necessary to know much about balanced rations, but this is not a theory, but hard cow-sense. [Laughter.]

Feed clover as it is in June, and keep your cow as she is in June; if you cannot keep her in this way, keep her as near in June conditions of feeding and temperature as possible, and you need not fear, with the right cow, but that there is profit in dairying.

Thus endeth the morning lesson. [Applause.]

Mr. Heritage—Will you kindly tell us about the summer silo?

Gov. Hoard—The summer silo should not be as wide as the winter silo, so that in taking out the feed you can go deeper for it, and be sure of getting sweet fodder. If the surface is large some of it is likely to spoil.

Mr. Fish—How about crimson clover as ensilage for summer?

Gov. Hoard—I think it would be admirable. Clover of any kind is good. Anything green is good, except, perhaps, sorghum, which is too sweet.

A Member—Do you believe in dehorning at all?

Gov. Hoard—I do not think it is a good thing to do, as I have already stated. I think there is danger of sacrificing too much for safety, and with the sire, especially, I think there is danger of nervous disorder resulting from the practice.

Mr. Gillingham—Is it better to have salt before the cows all the time, or is it better to give it with their feed occasionally, and if so, how much would you give them, and how often?

Gov. Hoard—That is somewhat regulated by the character of the feed you are giving them. A cow will not take quite as much salt with fresh, succulent pasture as she will on dry feed in winter. One reason for this, in the estimation of some people, is that, when feeding on succulent food, she takes in more water than on dry food, and nature demands more salt, so she will want more water with this dry food, in order that it may be properly digested. I know she will not eat as much salt in summer, when out at pasture, as she will in winter on dry food.

I want to say I don't know about the advisability of keeping salt before her all the time. I have never been convinced by experiment, although it might be as well for her to have it where she can get at it, and lick it whenever she wants it. I would also throw a little salt in her feed.

Mr. Phillips—If we take the horns off when the calf is a day or two old, does it do as much harm as if allowed to grow?

Gov. Hoard—That is another question. I spoke against dehorning cattle, because of the nervous shock it was likely to produce. That I believe would be detrimental. I don't know what the final effect would be under your proposition. In Ireland they have been dehorning their cattle for about thirty years, and they are awakening to the fact that their cows are steadily declining in quality as producers. Some of them believe it is due to the injury caused by dehorning the sires.

Mr. Phillips—I meant to kill the horns when they were quite young.

Gov. Hoard—That I cannot tell you.

Mr. Matthews—Do you favor dehorning dairy cows?

Gov. Hoard—It may be all right for the cows you buy and sell again. I am not sure that it has any marked effect, but for a cow I wanted to depend on for her progeny I would not dehorn. I don't dehorn my cows. I keep thoroughbred cows, and I have never had any bad results from not dehorning them. Learn the cows to be gentle, kindly and good Christians, and you have made a start on the right road anyway. [Laughter.] My cows are treated kindly in every respect, and no man is allowed to speak loudly or harshly to them, or to frighten them in any way, and they are not afraid of anyone. Strangers visiting the herd have to drive them out of the way, they are so gentle. It makes a great difference whether cows are reared rightly or not.

Mr. Fitzga—There is a great difference among dairymen as to whether cows can be healthy if they are kept in the stable all the time. Will it interfere with the health of the cow, or diminish the production of milk, if we have proper stables, and keep them in there all the time during the winter? People say they must have exercise, but it is the nature of the cow, when turned out to pasture, to eat her fill and then lie down without any other exercise. My experience is, if we keep them up for two or three weeks and then let them out for exercise, when we hang the pail of milk on the scales we find we have less milk than when they are not let out. Does it injure their health if they are not let out at all?

Gov. Hoard—My experience is very much like yours in that regard. I will give you my experience, but I can't run your minds for you. The function of milk-giving is the function of motherhood. Our own wives will teach us a lot about this, if we will only listen to them. Every mother nursing a child knows she should keep herself quiet and in an equable frame of mind, if she would have her child the same way. I heard a mother say once her husband gave her a sharp scolding in the morning, and her baby showed it all day. These things all reach down into the arcane of the mystery of motherhood. I don't believe a cow giving a full flow of milk needs any exercise to keep up her milk. She does not need it to help her give more milk, but she may need it to keep up the tone of her health. Construct your barns so the cow shall have a constant flow of fresh air, and you will have her in good health. We have tuberculosis tumbling in on us from every direction, and this is the lesson—plenty of fresh air in your barns—plenty of it. Give her at least

300 to 1,000 cubic feet of air space in the barn, and give her lots of sunlight. If you cannot give her these in the barn you must take less milk, and turn your cows out regularly. You cannot eat your cake, and sell your cake, and keep your cake. Use good judgment, and handle your cows right.

Mr. Fitzga—Do you confine your cattle in stables?

Gov. Hoard—My cows are breeding animals, kept for breeding purposes more than for milk. Milk is not the first consideration with me, although it is a strong one. I am looking for character in the calf—the offspring. We put them in the stables—we use the model stalls. Some of you may have seen descriptions of these. We turn them out in the sunshine every day for about half an hour, or perhaps an hour, for I want them to get all the sunshine possible. We give them water from an artesian well, at a temperature of about fifty-five in winter. This is a little warmer than ordinary well-water, as you know. Although we turn them out, as I have said, I believe they can be just as healthy kept in the stables constantly, provided the stables are healthy. In this connection let me call your attention to one most important point. Use plenty of land plaster in your stables. I wish I could talk this, and talk it, and talk it to you. We use it in our stables, and you can scarcely smell the ammonia or the smell of the stables at all. It absorbs and saves the ammonia and prevents injury to the lungs of your animals. Horses shut up in a tight stable are known to have ammonia blindness, and it is injurious to the breathing apparatus. You know how it affects your eyes when you shake up the bedding in the stables. There is this constant precipitation in the stable when occupied, and the land plaster will absorb and save the ammonia. This is much cheaper than paying fifteen or sixteen cents a pound for ammoniacal salts, and that is what you must do. Save your nitrogen. I cannot see why people will not do this. What is the matter with them?

Mr. Lippincott—Do you feed the same ensilage in summer as in winter?

Gov. Hoard—Just the same. The only difference is in the construction of the silo, as I have stated.

Mr. Gillingham—Could not the silo be filled with crimson clover, and this be used out before the corn ensilage was ready to put in? We have crimson clover in this section, and this is used to bridge over the hot spell in August.

Gov. Hoard—Can't this be put in the year before?

Mr. Gillingham—I meant to use but one silo for both the clover and the corn, and use out the clover before it was time to put the corn in.

Gov. Hoard—I have not tried it that way, but can see no objection to it.

Mr. Phillips—I had seven acres of crimson clover last season, and I put it in the silo; I got eighty tons of it. We had this to feed through the summer, after taking out the corn. When we were ready to put the corn ensilage in, in the fall, the clover ensilage had not all been used up, so we left it in the bottom of the silo, and went on feeding it. We cut the clover just the same as the corn, and found it made an excellent fodder.

Gov. Hoard—It could be gotten out better if cut, of course.

Mr. Phillips—Is there any such thing as a manufactured silo, coming in sections, which is transported, and which can be taken down and put up again, without building permanently?

Gov. Hoard—Yes, sir; there is no trouble to get a stave silo, and these will work all right in this section, where there is not so much trouble about freezing. The principal objection to them is that they must have an air space around them where the temperature drops low enough to freeze them, and in our country it frequently drops down to twenty to forty degrees below zero. Any lumber manufacturer can build you the staves, and you can get the hoops and put the silo together same as a tank.

The Secretary—I want to make a statement which will, I think, please you all. The dairy subject is to be continued this afternoon, and Gov. Hoard has consented to be with us and take part in the discussion. [Applause.]

REMARKS BY DR. H. M. MITCHELL, SECRETARY STATE BOARD OF HEALTH.

The Chair—I have invited Dr. Mitchell, of the State Board of Health, to talk to you about some dairy matters of interest to you, and I take pleasure in presenting him to the Board. [Applause.]

Dr. Mitchell—Mr. President and gentlemen, this is the first time I have ever had the pleasure of appearing before this body, although I understand my predecessor was frequently invited to talk to you about matters that overlap between this body and our department. There are such questions coming up all the while, and I shall take great pleasure in discussing them with you as they arise. I wish to occupy your time on one of these questions for about five minutes, although the subject is such an important one, and there are so many points connected with it, much more time could be profitably occupied in the discussion.

The adulteration of milk was, until comparatively recently, merely a commercial matter, a matter in which but few people took an interest, except from a commercial standpoint. The adulteration of milk had reference, almost solely, to the selling of the milk. When the consumer objected to being served with milk not having the proper proportion of solids, the law stepped in and inspected it, and established a certain percentage, below which the butter-fats must not go; and the modern view, or the view taken within the last few years, in relation to this adulteration, is wholly changed. Of course the addition of water as an adulterant has only been of interest as an adulterant from the standpoint of the sanitary people, when the water used was not pure water. The source of supply of the water has received much attention.

From the remarks I have heard since coming here I am satisfied I have missed a great deal in not hearing the entire discussion in regard to the dairy question this morning. Possibly I may repeat something which has already been told you this morning, but if I do you will understand that it is not intentional, and you can simply regard it as additional testimony on the subject.

The point at which the health department and the agriculturists touch just now is that of cleanliness. We may set aside all other questions at this time, and state that the demand among consumers of milk in the different communities to-day is for pure milk. I do not

think pure milk is exactly the right expression; they want clean milk. The point is this: Unless there is cleanliness and care exercised in the handling of the milk, in its care, in the use of pure water in the dairy, in the methods of handling the milk and the utensils containing it, in the cooling, storing, distribution, and in everything connected with it—in all these things—you should not let the sanitarians take hold of it before you do. Do not allow them to take the lead in this matter. It is a fact that sanitarians have heretofore led in these matters, and it is right they should have done so, as the matters have been approached from a sanitarian standpoint.

We know that certain diseases have been conveyed through the milk, when improperly handled, one of which is tuberculosis, also typhoid fever; scarlet fever, it is also thought, has been conveyed in this way, although not positively identified as yet. Sanitarians, as a rule, are shut up in their laboratories and do not know much about these methods of conveyance of the disease from a practical standpoint, and it is clearly your duty to take the lead in any legislation referring to this matter, as such legislation can thereby be made more practical and probably less onerous. Do not allow anyone else to lead in this matter, but go ahead yourselves. At the present time there is no antagonism, and the sole idea of the sanitarians is to promote the health of the consumers of milk. So far the matter has run along smoothly, but the pressure of the public back of this question will make it necessary to take some action at an early day, and I feel confident that such action on your part will not result in any objectionable inspection, and that it will increase your business and the demand for your milk.

It is said that between the ages of forty and fifty is the golden decade, the time when men acquire and retain what they get. It seems to me that 1898 is the golden period for the New Jersey farmers, because in this regard there is no antagonism as yet, and absolutely nothing has been done in the matter, although the public has been demanding that something be done.

The whole civilized world has been attracted by the diminution of mortality among children, and probably most of you have had your attention drawn to this. This diminution of the number of deaths among infants, especially in the large cities, is marvelous. In New York City Mr. Waring claims that the clean streets have done it; others claim that a better water-supply has been the cause. It is a

self-evident fact that not all the streets of all the cities have been kept cleaner, and that not all the water-supplies of all the cities throughout the country have been improved or purified, and it is the generally-accepted belief among those in a position to know that this is due largely to the purification of the milk-supply. They have learned to defend their children against the work of the bacteria in milk, and we know now that many diseases among children are due to the minute organisms found in the milk-supply. We know when these organisms are put into the milk they cause these conditions of disease; it has been demonstrated beyond any question of doubt.

I will ask you to accept these facts without proofs.

I must not say anything to you that partakes of repetition of truisms, but I want to impress on you the importance of pure water and pure air in the stables. In London, England, the authorities have set the pace in matters relating to public health, and every stable in which is kept a cow, or more than one cow, engaged in the production of milk for sale, must have a certain amount of air and light, and certain facilities for pure water and for cleanliness. Nothing along this line has been done here up to this time. Something should be done in the matter, and the agriculturists should take the lead in it. Suppose you should appoint a committee to draft an act providing certain requirements for the dairy premises of the State, and saying that certain essentials shall be insisted upon. Insist on plenty of fresh air, good water and good drainage. There are some other things, but these are important. Then insist on cleanliness on the part of those who handle the milk. You do not all know the kind of competition you are engaged in. In Hudson county there is a row of buildings about as high as one can reach, and this building is full of swill-fed cattle, brought from the abattoir, bought before they dropped dead. Great loads of garbage are hauled out for their food; all hauled in fancy wagons, so people won't know what is being hauled. This garbage is full of all kinds of refuse, and is of the worst possible form. This is fed to these cows, for milk-producing, and this is the competition you are asked to meet, and which we wish particularly to reach by some enactment. I think Mr. Dye has examined these stables and will bear me out in my statements. Everything is full of garbage, and filthy. Even the cans and other utensils are dirty with garbage, being washed in water which has been fouled with the garbage. We came to the Legislature two years

ago and asked for a bill, the best we could do at that time. We now ask that the farmers take the matter up, with a view to securing proper legislation in the matter of cleanliness in dairy work. The sanitarians will be with you in the matter. One gentleman objected strongly to the bill we introduced, claiming that no such bill was wanted, and the bill was killed. I think the gentleman I have referred to caused this. He objected to any inspection, or any supervision by the State authorities. It is not proposed to have any inspector with special liberties, but simply one to inspect the stables, and see that no practices are in vogue which may be prejudicial to the health of those using the milk from such dairy, and to see that the water-supply and fresh-air supply are what they should be, as well as the drainage of the stables.

We know of one place where over 100 cases of typhoid fever can be directly traced to the water used in the dairy, and it is such cases as this we wish to reach and prevent.

I thank you, gentlemen, for your kind attention.

A vote of thanks was extended to Governor Hoard for his entertaining and instructive address, and also to Dr. Mitchell for the suggestions thrown out by him.

REPORT OF THE STATE TUBERCULOSIS COMMISSION.

FOR THE YEAR ENDING JANUARY 13TH, 1898.

REPORT OF THE STATE TUBERCULOSIS COMMISSION.

The dairy business, if carried on according to necessary requirements, is a complicated and exacting one, and no man who disregards those requirements is qualified to furnish milk to the consumer. Some of these requirements are:

First. Knowledge of the absolute essentials to the production of pure milk and methods of handling and marketing, so that it shall reach the consumer in an uncontaminated and healthful condition.

Second. The enforcement of such rules of practice on the part of workmen in all the work of the stable, as feeding, watering, cleaning, milking, and the health and cleanliness of milkers, as shall contribute to the one end—clean, pure, healthful milk.

Third. Pails, cans, bottles, or whatever utensils may be used for milking, aerating and transporting milk to market should be made scrupulously clean *immediately after* each service, so that neither filth nor disease germs shall find a lodging place in or on them.

Fourth. Study of the business, of the market demands and of the relation of milk to the public health as a food.

Fifth. Stock above the suspicion of disease, especially tuberculosis, and to secure this a regular examination of the cattle, by a competent veterinarian, and if disease is found to exist, such animalsto be separated from the healthy ones until cured or slaughtered.

Sixth. Stables so constructed as to be light, dry, well ventilated and with ample air-space to each animal. Some say three-fourths of a cubic foot to each pound of weight of animal.

Seventh. And, above all, to realize and act upon the fact that the surest road to perpetual immunity from tuberculosis is—starting with healthy animals—to create and maintain such conditions of stable-life, feeding and management, that the tuberculosis bacilli will not find a congenial spot for development anywhere.

Close, dark, damp, poorly-ventilated stables are calculated to reduce the vitality of the animals. They thus become susceptible to invasion by the bacilli. At the same time, such conditions as have been stated are in every way conducive to the multiplication of the bacilli of tuberculosis.

They will find a breeding place somewhere, and human ingenuity may never be able to entirely prevent this, but we can so improve conditions as to greatly, if not entirely, reduce the possibility of disease from this source, and thus prevent the serious consequences which sometimes follow its introduction.

Furthermore, the Commission would again emphasize the very great importance of not allowing any person affected with a contagious disease to have anything whatever to do with the dairy work. The individual dairyman cannot afford it, the business cannot afford it, and, more than all, the consumers of milk cannot afford it. Quite frequently, in cities where certain contagious diseases are discovered, city Health Inspectors direct their first investigations to the milk-supply of families affected. In view of this fact, it becomes very important that dairymen should be careful to allow no suspicion of contamination from diseased attendants or from the water-supply to attach to their dairies.

To remove from dairy herds animals believed to be dangerous to human health, and to inaugurate such improvements in dairy management as would reasonably guarantee against tuberculosis outbreaks, the State Tuberculosis Commission was constituted by the Legislature. And some compensation is allowed by law to farmers for animals having a market value in order to encourage them to co-operate with the State in the effort to purge dairy herds affected with this disease, and to place our milk-supply above reasonable suspicion. To do this quickly and thoroughly the movement for dairy examination should be general where there is any suspicion of this disease.

Some milk-producers, no doubt, fear that if any examination is made and the fact becomes known to their customers it will place their dairy under suspicion. This ought not to be so, but rather as a guarantee that such dairyman is using all needed precaution to produce a pure and healthful article for his customers. The importance of immediate action and thorough and permanent reform in dairy management along the lines previously suggested, where such necessary

requirements do not exist, must be apparent to all progressive dairymen.

The Commission have reason to believe that more men than formerly who produce milk for the market are seeking to furnish a wholesome article. But there are many others who are indifferent to the requirements for the production of a healthful article—so long as their milk goes, all is well. Such the Commission have no power to control, as the work of the Commission is restricted to voluntary applications, and such others as may be placed in their charge for investigation by the State Board of Health or by the State Dairy Commissioner.

The applications are numerous from owners of private or family dairies, of one or more cows, to have inspections made. The comparative expense in attending to such is much greater than in cases where many cows can be examined in the one visit. This fact has the effect of reducing the *total* number of examinations in any one year, as stated in the report, while it rapidly consumes the appropriation. It is thought by some that the investigations of the Commission should be restricted to commercial dairies, leaving private dairies to the supervision of local Boards of Health.

If this were done the appropriation would more nearly cover the work of the year. With the demands now made upon it, it is insufficient to do this, as stated in the report of 1896.

As to compensation for condemned animals, some farmers and appraisers are emphatic in their opinion that the owner should receive compensation equal to the market value of the animals prior to the time they were affected by disease. If this were so the owner, in most cases, would be the only one sufficiently acquainted with the past history of the animal to fix such valuation, and appraisers would not be needed.

The amendment to the original act, however, clearly says the appraisement shall be on the basis of their market value *when condemned.* The Commission has acted on this interpretation.

It is not the purpose of the Commission in this report to rewrite what has been so often stated in some way to reading dairymen. We would, however, state emphatically that from our observations throughout the State, the greatest immediate reform needed is in the stable-life of cows. And this applies to private dairies with even more force than it does to commercial dairies. Owners of the

latter class are realizing more than ever the great necessity for best management if they are to find a paying market.

The former are indifferent, and largely through ignorance. Some of the great defects are: Crowding too many animals on a limited floor space. Lack of air space above, in front and behind the animals. Lack of sufficient ventilation, or ventilation so arranged as to make dangerous draughts of air on the animals. *Great deficiency of light.* Damp stables and, if dirt floors, constantly wet—even muddy. Stables and doors barricaded with rotting manure. Surrounding barnyard (the cattle's playground) a quagmire of filth. Unsuitable bedding, as half-rotted, mouldy straw, bog hay and the like. Dirty, untidy methods in feeding, allowing hay-seeds, dirt, dust, roots, silage, malt-sprouts, &c., in varying degrees of mixture and decomposition, to accumulate, thus aiding to further pollute the air, besides furnishing the best conditions for bacterial growth. Allowing diseased animals to remain in stables with healthy ones. Putting healthy animals into disease-polluted stables. Failure to use disinfectants and absorbents. Feeding badly-fermented food and musty hay and stalks. Infrequent watering, impure water, exposure to cold and to stormy weather.

But the above hints must suffice for this report—the wise will heed them. There is room for a treatise on the perfect dairyman, dairy and dairy management.

The report of examinations made, cattle condemned, &c., is as follows:

County.	Total No. Examined.	Total No. Condemned.	Total Sum Paid.
Bergen	2	1	$30 00
Burlington	36	14	315 00
Cumberland	16	3	37 50
Gloucester	20	...	.....
Hunterdon	85	11	181 50
Mercer	143	33	852 00
Middlesex	58	8	222 75
Monmouth	8	1	6 00
Morris	65	..	.....
Ocean	55	16	446 62
Passaic	2	...	.....
Salem	154	21	556 50
Somerset	90	20	472 12
Sussex	53	3	60 00
Warren	78	3	120 00

Total appropriation		$5,000 00
Total sum paid for cows	$3,299 99	
Expenses of inspection	961 42	
Secretary, stenographer, expressage, printing, postage and Commission's expenses	743 62	
		$5,005 03

D. D. DENISE, President, Freehold,
JOSEPH B. WARD, Vice President, Lyons Farms,
CHAS. HOWELL COOK, Treasurer, Trenton,
FRANKLIN DYE, Secretary, Trenton,
ISAAC W. NICHOLSON, Camden (deceased),
WM. C. PARRY, Hainesport,
B. E. TINE, Stanton,

Commission.

ABORTION IN CATTLE.

BY JULIUS NELSON.

ABORTION IN CATTLE.

Popularly speaking, abortion is the separation from the womb of the developing young animal before it is capable of being reared. Scientifically, in the broadest sense, abortion includes all cases of death of a fœtus due to interference with its intra-uterine development, whether such death occurs before birth or afterwards, immediately or after some time, and at whatsoever stage of the gestation period. We need not therefore bother with distinctions between abortion proper and premature delivery.

In the cow the normal period of gestation is nine months, or 280 days, but, exceptionally, normal birth may occur a month earlier or later. According to Earl Spencer, a calf born before the two hundred and forty-second day cannot be reared, and one before the two hundred and sixtieth day is prematurely born. But, according to our definition, if a full-term calf is sickly, and soon dies, it is a case of abortion, provided it can be shown that such weakness is due to the causes that produce premature death in ordinary cases of abortion.

Any influence which sufficiently weakens the fœtus or its membranes so that the placental organs do not properly fulfill their vital functions, and also any cause acting on the uterus to make it contract with sufficient force to expel the fœtus, will produce abortion.

Frequently the fœtus is dead in cases of abortion before the expulsive efforts of the uterus begin, and in exceptional instances a dead fœtus may be retained, being either dried up or absorbed, or if putrefactive germs have gained access, it undergoes decomposition in the womb.

It is evident that in the treatment of abortion, or of a threatened abortion, we should bear in mind the two diverse classes of causes that produce abortion, one class residing in the fœtus, the other in the mother. These two classes of causes correspond very nearly with the two kinds of abortion as usually recognized, viz., (1) sporadic or accidental abortion, due to disease of the mother, to ergotism, to chills,

blows, over-exertion, fright, jams, &c., and (2) contagious, epidemic, enzootic or infectious abortion due to germs which infect the fœtus and its membranes, and that especially thrive between the inner surface of the womb and the fœtal attachments.

It may pertinently be asked whether, when there are isolated cases of abortion, these may not be due really to the presence of the germ of abortion and not to the accidental causes to which they are naturally attributed. If germs are present do they not so weaken the placental union that when the accidental cause occurs an abortion happens, though in the case of a healthy placenta the same accidents would have been impotent to produce such a result? Experimentally, cattle have been fed with ergot until they manifested symptoms of ergotism, yet no abortions occurred. When cases of abortion do occur while ergot is being fed it does not follow that ergot is the cause of the abortions even if they would not have happened in the absence of such feeding. A case was reported of a pack of hunting dogs stampeding a herd of cattle containing eighty-five pregnant animals, and forty cows aborted within two months thereafter, beginning the second day after the fright. It is simply impossible, in the absence of closer details, to say to which class of cases this belongs. Only cases of apparently accidental abortion, in which it can be proven that no abortion germs were present, can be accepted as belonging to the sporadic class. All cases in which germs are present come under the head of contagious abortion, even when they are not manifestly epidemic.

Compared with contagious abortion, sporadic abortion is of little importance, and shall not engage us further, except to state that the subject of accidental abortion requires renewed study. A comparison should be made between accidentally-induced abortion in cases with the presence of germs and in their absence.

The presence and activity of the abortion germs in the uterus during the period of development does not necessarily cause an abortion. There are variations in the virulence of the germs, of the vigor of the fœtus and of the resistance or tone of the uterus. An early abortion implies a high virulence of the germ, and low resistance of the fœtus and uterus. Such conditions are so favorable to the development of the abortion lesions that the ordinary vicissitudes of climate and the occurrence of the so-called "sporadic" causes will readily precipitate the abortion. The germ may be so active as to cause the

death of the fœtus, so that abortion will occur in spite of the most favorable conditions of envoironment and absence of exciting accidents. A late abortion implies a weaker germ and stronger resisting powers, but it may also be due to a later infection.

Taking these factors into consideration, it is no wonder that abortions occur at nearly all stages of development, though they are rare before the fourth month, and most numerous from the fifth to the seventh. But in infected herds some of the full-term calves have abortion germs clinging to their skin, perhaps passing in their excretions, and certainly present in the after-birth and in the uterine discharges of the mother.

In cases of abortion the after-birth is extra thick and extra brittle, and is usually retained. At the time of calving the putrefactive germs of the air gain access to the uterus and set up decay of the retained membranes. About the time of the abortion a yellowish or reddish, slimy discharge, containing pus-like granules, flows from the uterus. It is a catarrh of the uterine walls, and contains the germs of abortion; it is alkaline and odorless. As soon as putrefaction of the after-birth occurs the discharge grows darker, becomes foul-smelling and is acid in character; it kills spermatozoa and thus causes sterility or a failure of pregnancy. This explains why farmers generally isolate aborting cattle, and do not breed from them until all discharges have ceased.

In 1886 Nocard discovered that abortion is a disease of the fœtal placenta, and due to germs. He found two sorts of germs in the uterine discharge, and in different parts of the calf, but inoculation with cultures of these did not cause abortion, though various experiments had shown that inoculation with the diseased after-birth would often produce abortion, and certainly it was frequently seen that the introduction of a sound cow into an aborting herd would infect her, and that a cow from a herd in which abortion was prevalent if introduced into a sound herd would in a few months produce an epidemic of abortion there. Nocard was the more convinced that abortion was a germ disease because he cut short an epidemic of abortion that had lasted eleven years in one herd by simply applying methods of disinfection.

It remained for Professor Bang, the eminent Danish veterinarian, to settle two important points: (1) That there is one specific germ which causes abortion. (2) That it takes at least ten weeks after

inoculation before the abortion occurs. These discoveries were made in 1896 and 1897. Professor Bang has also shown that the after-birth becomes contaminated by foreign bacteria at the time of the abortion, so that no pure cultures of the genuine abortion bacillus can be secured from cases of abortion unless they are investigated much sooner after the birth of the calf than happened in Nocar's researches, and he has further discovered that the abortion germ will not develop except in culture media of peculiar composition (not used by Nocard), and under extraordinary conditions of oxygen pressure. Thus it is quite doubtful if Nocard's cultures contained the abortion bacillus at all, though one of the two sorts of germs discovered in the uterine secretions, by microscopic examination, may have been identical with the abortion germs of Bang. At any rate, Nocard believed that abortion is produced by one or more of the germs common in the intestinal and vaginal passages, while Professor Bang always found his specific bacillus present in a pure culture in the uterine secretions of cases of abortion if the specimen was fresh. He has cultivated these germs in the laboratory, keeping them alive for many months, and has used these cultivated germs in inoculation experiments upon pregnant cows, mares and ewes secured from farms on which abortion was unknown. After the lapse of the proper incubation period he has demonstrated the presence of specific germs and of the lesions of abortion in almost every instance.

Let us describe some of his experiments. A four-year and a seven-year cow, bulled January 14th and 16th, 1896, were inoculated April 14th. On June 23d the first symptoms of abortion were seen, and next day the four-year-old aborted a five-months fœtus which had been dead several days. The after-birth was retained and was not secured for examination until six hours later, when it was found infected by putrefactive germs. The same day the seven-year-old cow was slaughtered, and the intact uterus containing the fœtus was placed on ice, and five days later was dissected before a convention of veterinarians before whom Professor Bang showed that the characteristic lesions of abortion were present. The fœtal vessels were injected by stagnant blood, making the cotyledons red; a few had turned gray, indicating their death, but the fœtus had been alive at the time of slaughter. The after-birth was thick and brittle, and was detached with difficulty from the uterus. Between the fœtal villi and the walls of the uterine crypts there was present the alkaline odorless fluid indicative of the uterine catarrh.

In another experiment a cow gave birth to a puny full-term calf eighty days after inoculation, both through the vagina and the blood. The germs were present in the discharges, the after-birth was retained, undergoing decomposition and causing inflammation of the uterus, from which the cow ultimately recovered. The calf, however, was attacked by diarrhœa after living two weeks and was killed. It is quite characteristic for calves that have aborted to be attacked by a diarrhœa, ultimately resulting in death. They meanwhile give a peculiar bellowing cry, such that an experienced person can tell from the cry alone that the animal has been aborted.

Two ewes were inoculated per vaginam, and 147 days later one gave birth to a lamb which throve, but the after-birth contained the germs and showed the characteristic lesions. The other ewe was killed, but nothing abnormal was seen. Thus, in this case, the germs had failed to reach the uterus. Two other ewes were inoculated through the blood system. Their lambs were normal, but the after-births showed the characteristic lesions and contained the specific germs.

It must be remembered that abortions are ever so much less frequent among sheep than among cattle. They thus seem to be less affected by these germs.

A mare was inoculated in the jugular vein; a foal was aborted that died. The mother seemed healthy, but the after-birth showed the lesions of abortion, and the specific germs were present.

In the light of these results we can explain many of the peculiar and apparently conflicting facts that have been observed with relation to abortion, and that have given rise to conflicting theories and to so much confusion in thought about the subject that many have termed abortion the "mysterious" disease, and others have relied upon charms to exorcise the evil. The practice is quite widespread of putting a goat with the aborting herd, that its peculiar odor may drown out the smell of the abortion products, which are supposed, through some peculiar influence or "sympathy," to cause the epidemic of abortion. This remedy has been declared efficacious in more than one instance in New Jersey. But epidemics of abortions usually die out of themselves, if no new cows are introduced into the herd. This fact indicates either that the germs become attenuated in virulence by remaining in the same animal or that the animal gains immunity or acquires resisting power. Perhaps both suppositions are true. At

any rate, Professor Bang has found living germs in a uterus under such conditions that he was sure they had been there at least nine months. It is very evident, then, that the abortion germs can live over from one pregnancy to the next, and that living germs are probably present in the uterus of the cow which has been isolated after abortion until all discharges have apparently ceased. Thus it is clear why abortions are so frequently repeated in the same animal. But it is also a fact that a very large percentage of cows that abort once do not repeat the abortion, at least at the following pregnancy, and of those that do repeat it the large majority cease to abort thenceforth. Young cows are inclined to abort on their first pregnancy, and thus to acquire an early immunity. It has even been stated that the calves born in a herd where abortion has prevailed are less liable to catch the infection than are new animals of older age that come from farms where abortion has been unknown. This points either to the presence of an acquired immunity in the herd or to the fact that if the germs have become attenuated, they regain their virulence on being transplanted into new soil.

It has been claimed that new cows introduced at the beginning of an epidemic of abortion are more subject to infection than are the new cows introduced later on, and it is held that this shows that the germs become attenuated. However this may be, it seems to have no great practical value, for several cattle-owners have for a long series of years vainly tried to rid their herds of abortion by selling their aborting animals and replacing them with new stock. They have found that by stopping this method of treatment the epidemic has died out naturally in three or four years.

Unfortunately for this method of eradication, a respectable percentage of the aborting cattle are rendered permanently sterile, and as a much better mode of eradication exists, this method of treatment cannot be seriously entertained.

In Professor Bang's experimental herd of 130 milch cows and thirty heifers there were 208 naturally-induced abortions in twelve years, ranging from eleven to twenty-three cases per year. About half of them were on the first pregnancy, of which only twenty repeated the abortion the next year. But of those that went full term with the second calf twenty-three became barren later, while of thirty cows that aborted two successive years, twenty-two were sterile the following year.

It has been found that when a pregnant cow, from a herd where abortion is not known, is introduced into a herd where abortion prevails, she will carry her present calf all right, but abort the next one, provided she is well along in pregnancy (say at six months) at the time she is placed with the aborting herd. This is readily explained when we know that it takes a long period of incubation before the germs produce the abortion. When we consider that few abortions occur earlier than the fourth month, and that the majority happen at the sixth month, we might conclude that the natural incubation period for the abortion germ is a corresponding period. It is evident that if it takes at least ten weeks to produce abortion when large numbers of bacilli are introduced by artificial methods, it must take correspondingly longer for a natural infection, involving the chance transference of relatively few germs, to produce abortion.

We next consider the subject of the method of contamination or of infection. In 1872 Johne noted a case of the regular transmission of abortion from cow to cow up one row in the barn, across the passage, and down the opposite row. This epidemic was stopped by applying disinfectants to the tail and vulva of the cows.

It seems plain that the discharges from the aborting cows, soiling the tail and the litter behind them, were transferred to the vulva of the next cow, but it is not so easy to understand how these germs, which are not motile, could make their way into the uterus. There is increasing belief, among students of abortion, that such transfer takes place through the agency of the bull. The spermatozoa are motile and the germs may stick to them and so become readily transferred. Several veterinary surgeons of Denmark have reported that they have observed facts that led them to infer that infection took place through the agency of the bull. In one herd, free from abortion, having an old and a young bull, the old bull lodged two days with an aborting herd, and on returning to his own herd all the cows covered by him aborted, while of those served by the young bull not one. Such an experience might lead to the erroneous conclusion that abortion was caused by some weakness due to the age of the sire.

In another case, a farmer with a herd of sixteen cows allowed seven of his cows to be cross-bred to a neighbor's bull, and they all aborted—five at ten weeks, one at three months and one at four and a half months. In this case the farmer kept the epidemic from spread-

ing to his other cows by promptly isolating the animals and applying proper disinfection.

Bang also reports the case of a farmer who introduced thirty-two cows in the later stages of pregnancy into his aborting herd and they all carried their calves full term, but the next year eleven of them aborted at from the fourth to the eighth month of gestation. In this case it would be difficult to say whether these abortions resulted from early or from late infection. It is even possible that abortion germs gained entrance to the uterus at the time of calving.

The wide prevalence of abortion and the considerable pecuniary loss connected with each case (calculated as equal to $30 or $40), make it imperative that this disease, which can so readily be controlled by disinfection, should be promptly eradicated or at least held in check. It is plain that there are two critical periods when extra vigilance is needed. The first is when an abortion occurs. At this time, and for a considerable period afterwards, abortion germs are being expelled in abundance. These germs should be met and conquered by means of disinfectants before they have the chance to reach the other animals. At this time, too, it is possible to reach the interior of the uterus and disinfect the very fountain of supply. If this is impossible, then it will be necessary to irrigate the vagina daily with disinfecting solutions and to wash the tail and external parts of the cow with still stronger solutions, and to apply assiduously the most efficient disinfectants to the stall in which the animal is isolated. She should not be used for breeding purposes if her uterus has not been disinfected. The other animals that may have been or be exposed to infection should receive frequent vulvar washings and occasional vaginal irrigations during the period of exposure, while the barn is kept generally disinfected.

The second critical period is when an animal is to be served. Preceding service there should be a vaginal irrigation with disinfectant solution and careful external washing. Then the disinfectant should be washed out of the vagina by means of tepid, boiled water, that the spermatozoa soon to be introduced may not be injured. The stall of the bull and, as far as possible, the bull himself, should be disinfected, even if it be uecessary to complete such disinfection at the time of service.

In this way a herd may in time be purified. To illustrate how disinfecting measures have been successfully applied, we briefly sum-

marize one case. (See Desmond in "Journal of Comparative Medicine and Veterinary Archives," 1895.) In a herd of eighty cows forty calves had been "slipped" during the course of a few months. Desmond stopped the epidemic in this way: After cleaning and disinfecting the barn, two casks were placed in position above the level of the cattle, and to them was connected rubber tubing. One cask contained the irrigating fluid, the other was for general disinfection. The irrigating fluid consisted of water, 30 gallons; salt, 3 pounds; corrosive sublimate, 1¼ ounces. The disinfecting fluid was composed of water, 30 gallons; corrosive sublimate, 5 ounces. When this latter fluid was exhausted the cask was filled with water, 30 gallons, in which was dissolved 3 pounds of iron sulphate. The sulphate solution was alternated with the corrosive sublimate solution in barn disinfection.

All the cows then received each two gallons of irrigating fluid each day for a few days. The first and second day only a foot of tubing could be passed into the vagina, but the third day the tubing penetrated two feet, and a surprising mass of mucus was washed out. Under this treatment the cows soon came into heat, and only four cows aborted afterwards, but they could not be properly irrigated.

Corrosive sublimate is so very poisonous that it is advisable not to use it for internal disinfection, especially in the uterus. In fact, creolin is useful in all cases, a 1 per cent. solution being used for the uterine irrigation, 2 per cent. for the vagina, 3 per cent. for the vulvar washing, and 4 per cent., or stronger, for the barn and litter.

We conclude this paper with some reference to the prevalence of abortion. Fleming, in his "Veterinary Obstetrics," reports that statistics on this point are not readily obtained. At Hohenhain, from a register kept for thirty years, it appeared that one-fifth of the cows aborted, *i. e.*, 20 per cent., but that the abortions among the sheep of the same establishment were only half a per cent. As to epidemics of abortion, they have been known from the earliest times. Heûze mentions that in the Nievre (France), in 1869, the loss to various agriculturists ranged from 30,000 to 50,000 francs. It is frequent, prevalent and serious, according to reports from Germany and Holland in 1852. In recent literature abortion is considered to be at least at prevalent as tuberculosis. Some authorities report a loss in infected herds ranging from 20 to 70 per cent., while Penberthy thinks that,

taking all cattle together in his locality, they are affected to the extent of 5 per cent.

Bang reports that among mares the average loss of foals is not over 4 per cent., but that at exceptional times it reaches over 25 per cent. In 1889 and 1890 an epidemic of abortion among the breeding mares of the Mississippi valley reached 75 per cent. Of course such an epidemic as that is fatal to the breeding industry for the time being. Veterinarian Sands sent a circular of inquiry as to the prevalence of abortion to the veterinarians of Denmark, and received forty-five answers, of which eleven replied, "pretty common;" twenty-three, "very prevalent," and eleven, "a veritable scourge." The New Jersey Experiment Stations sent a similar circular of inquiry to nearly 500 of the cattle-owners of this State. One hundred and ninety-four replies from 103 localities were received. Of these, eighty-nine replies from sixty-seven localities report personal knowledge of the prevalence of abortion in their neighborhood or in their own herds, either at present or recently, or some years back. The consensus of opinion seemed to point to the conclusion that abortion is not so prevalent now as formerly. In fact, several correspondents stated that they had checked the disease by the application of methods of isolation and disinfection. This advance in methods of treatment seemed to be due mainly to the practice of veterinarians.

A Member—It has been said that the introduction of a goat in the herd of cows will stop this abortion.

Professor Nelson—Yes, we have heard of this, and we also have reports of she-goats catching the disease from the cows—a veritable scapegoat. [Laughter.]

Mr. Gillingham—What is the strength of the corrosive sublimate that should be used?

Professor Nelson—1¼ ounces of corrosive sublimate to 30 gallons of water. That is for irrigation. It should be 5 ounces to 30 gallons of water for disinfection.

Governor Hoard—Do you consider sulphuric acid a good disinfectant?

Professor Nelson—This is recommended for general purposes in the barn.

Governor Hoard—I have had an experience on this line. In 1887 I was severely bothered with this abortion among cattle. I bought

some Jersey thoroughbred cattle in Chicago at the McCormick sale, and they aborted at their first calf. In 1888 I was troubled again with a herd of Guernseys that commenced to abort. I then commenced to use land plaster in my stables—using it very plentifully. That is 40 per cent. sulphuric acid. I have had no abortion since. I have a large number of dairymen around me who use this land plaster in their stables, and there is practically no abortion among their herds. I think the germ of this disease was discovered in 1886 by Nocard, if I am not mistaken.

Professor Nelson—He discovered two kinds of germs which infected the fœtus at the time of the abortion.

Governor Hoard—Did he not make cultures of these germs?

Professor Nelson—Yes, but he failed to produce abortion by inoculation with his cultures. By his work, however, abortion was discovered to be a germ disease.

Governor Hoard—I think it was discovered nowhere except in the lining of the placenta and in the bowels of the fœtus. We have been bothered in breeding-herds with the death of the calves, when about three days old, from diarrhœa. In my judgment this is caused by the abortion germs. In almost every case I have found the first expulsion from the bowels to be a reddish fluid, same as that coming from the cow at the time of aborting. This is always of a reddish or brickish color in my cows.

Professor Nelson—Such germs have been found in the intestines of the calves.

Governor Hoard—Has the giving of sulphur been found to be beneficial?

Professor Nelson—I never saw a statement to that effect.

Governor Hoard—I think I have had some effects from it; we have used it quite generally, but I am not certain as to the results. It is a germicide, of course.

Professor Nelson—Any disinfectant absorbed in the animal acts on the tissues as well as on the germs, and if it is made weak enough for the animal it is not strong enough to kill the germs.

Governor Hoard—I think the use of land plaster not only disinfects the bedding but also the vulva of the cow.

Professor Nelson—This is one of the encouraging features, that cleanliness begins to show a good effect. If you want to be absolute you get absolute results. Good returns are frequently found from

even a little disinfection. Of these gentlemen who have sent replies, thirty who have been bothered with abortion, have used various kinds of disinfectants in the barn. No doubt this is one reason there has been less abortion since.

Mr. Evans—What treatment is best for young heifers? I do not understand that you recommend anything for them.

Professor Nelson—I would isolate them from the cows.

Mr. Evans—I mean heifers coming in the first time.

Professor Nelson—That may introduce another question. It is conformable to the general experience that young cattle do abort, but that one abortion renders them immune.

Mr. Evans—They may go barren.

Professor Nelson—Occasionally they do.

Governor Hoard—That is my experience.

Mr. Lindsley—Would sulphate of iron make a good disinfectant?

Professor Nelson—Yes, sir.

Mr. Lindsley—For the last two years I have treated my stables with sulphate of iron three times each week. I was considerably troubled with this abortion, but it has left my stables entirely, and I think they are now all right. It may be that this has done the work. It costs but little to apply it.

Professor. Nelson—One thing to be remembered in this connection is to use no disinfectant the odor of which will be readily absorbed by the milk. This is one reason why dairymen have looked favorably upon land plaster and various applications of lime for this purpose.

Governor Hoard—Do you use creolin?

Professor Nelson—Yes, sir. It is better than carbolic acid, as it does not coagulate the material with which it comes into contact. Both corrosive sublimate and carbolic acid coagulate, while creolin does not.

Governor Hoard—In irrigation?

Professor Nelson—In all ways. For the internal, one-half per cent.; external, three-quarters per cent.

Governor Hoard—Before abortion?

Professor Nelson—At any time when it is possible to apply it.

The following is a synopsis of eighty-three replies to the questions as to prevalence of abortion and its treatment by disinfection. The numbers refer to the list numbers of the answers on file:

1. Have had cases of abortion—several in succession. Never found any treatment beneficial.

2. Have had cases of abortion. I give anti-aborsio and disinfect barn with 4 gallons water containing copperas 5 pounds, carbolic acid 1 tablespoonful.

3. Epidemic in my herd eleven years ago. Isolated, gave Excelsior cattle powders, kept cows from bull three months. Sprinkled stable with carbolic solution and land plaster.

4. Abortion has run through my neighbor's herd for two years. Young cows most susceptible. Used chloride of lime in barn.

5. Two cases in my herd. No treatment.

6. Three cases in 1896 and one in January, 1897. Isolate and sprinkle plaster.

7. (Veterinarian) Two epidemics per year—entire herd. Used 10 per cent. creolin, mercuric chloride, carbolic acid.

8. One cow aborted twice. Fed ground bone meal.

9. Few cases in locality. In barn use slaked lime, carbolic acid.

10. Eight cases—mostly in 1896. No treatment.

11. One case, due to ill-treatment by a farm hand.

12. No abortion for last three or four years.

13. Last year lost several calves. Isolate, and syringe with creolin solution while discharge is worst and wash with same, also sprinkle carbolic acid on floor.

14. Few cases this year, but two months ago was bad in neighbor's herd. Give bone meal and smear Carolina tar on manger and cow's nose.

17. One case last year. No treatment.

18. Three cases. Disposed of two

20. Quite a number in locality, but not in my herd. Twenty-five years ago lost three-fourths of calves. Never had but two cows abort more than once.

21. Epidemic in locality four years ago. Some herds entirely affected. Isolation and introducing goats stopped it.

23. Few cases three years ago. Isolated, syringed vagina with warm carbolic soap. Removed products of abortion; evaporated carbolic acid in barn from suspended cloths.

24. Three years ago epidemic; lost twelve or fifteen calves. Veterinarian injected something and stopped trouble.

25. For abortion, which is contagious, I isolate and sprinkle plaster and lime.

28. (Veterinarian) Isolate and antisepsis.

29. Common some years ago. Billygoat was efficient remedy.

30. Some cases. Bought cows most subject. No remedies.

32. One case, then spread through the herd.

33. Mysterious disease. In 1896 brought young cows through all right by giving carbolic acid in feed twice daily. Cement floors.

36. Some cases here; have known it to affect the entire herd.

37. Rare, but we always isolate.

38. Some cases in 1896; isolate and use land plaster.

39. Heifer aborted three times, then sold her for beef.

41. Two to three per cent. loss per year Use carbolic acid and chloride of lime.

42. Eight per cent. loss per year for eighteen years. Asafœtida and Jones' cow remedy good. At present give crystallized carbolic acid, with good success.

43. Few years ago epidemic in herd (one or two cases per week) and locality; lasted two years. Consider *Viburnum prunifolium* sure cure. Also sprinkle carbolic acid and lime.

44. Lost twenty-six calves, most in fifth month; only four calves survived; introduced into herd by purchased cow. Veterinarian treated by disinfection. Think cotton-seed meal aggravates disease.

47. Neighbor lost six out of twenty. Stopped when ceased to feed rye.

48. One or two cases from accident this year. Used land plaster.

51. One case last year at four months. Made beef of her. Cases in previous years. Hang bottles of crude carbolic acid in barn.

52. Have had experience with contagious abortion. Stopped by isolation.

53. One whole herd and one of neighbor's aborted.

54. Five cases, nine years ago. Seemed to take it from each other every three or four weeks. No remedies.

55. Two cases aborted twice last eighteen months at five to seven months—another case lately. No remedies.

56. No cases. Use crude carbolic acid, chloride of lime, fresh air and sunlight.

58. Few cases in locality. Air-slaked lime dusted about frequently.

60. Few cases—possibly epidemic.

61. Not of late in my herd. One case in locality. Isolate and give asafœtida in feed.

62. Few cases. Isolate and delay service until clean.

63. A number some years back. Employed a veterinarian.

64. Yes, but not epidemic. Carbolic acid used in barn.

66. Occasional case in locality—considered result of injury.

67. Yes—not epidemic. Isolate—use no disinfectants.

68. Neighbor had nine last winter and two this summer. Not epidemic.

71. Some complaint in locality. No disinfectants.

72. (Veterinarian) Not recently. Few years ago two herds, one of sixty-four animals, all, with few exceptions, aborted.

73. Many cases; general in county. Some claim it is transmitted by bull. Often goes through a herd for a year or two. In some herds some cases every year. Feeding malt seems to favor it. More abortion this year than usual. Lime and carbolic acid are generally used—no other treatment.

74. Neighbor had four or five cows two years ago. Use thymo cresol for stable.

75. Occasional case. Most loss is through barrenness. Have to sell cows for beef at low price. Land plaster absorbs foul odors.

76. A long time ago had epidemic; cows aborted but once; thought due to corn smut and cotton-seed meal. No remedies.

77. No recent cases; rarely able to get cow with calf again. Bury all refuse, isolate, disinfect stable with lime.

78. Twelve to fifteen years ago lost all calves one year; some born dead; others lived a day or so.

79. Heard of one herd only in locality.

80. Two or three years ago; no disinfectants.

83. Several cases in locality; epidemic. Remove after-birth and wash cow with creolin and water.

84. Isolated cases in own herd, due to injury, became next year all right. One neighbor, few years ago, lost all calves and sold herd. One cow aborted four times

in succession and then gave birth to fine calf; no further trouble. Another herd likewise affected and disposed of. No further trouble with the new cows. Must isolate to keep disease from spreading.

85. One case from injury. Neighbor had three or four last year. No cause. No disinfectants used.

86. Appeared in our herd five years ago. Lost twenty-five per cent. per year, but none recently. No treatment known.

87. (Veterinarian) Several years ago one herd lost five; another lost three in four days; also another herd affected. Chloride of lime.

88. One or two cases per year in each of several herds in locality. Isolate.

89. Yes, but no remedies; no disinfectants.

90. One case in neighbor's herd twice same year. No treatment.

91. Quite a number in locality; liable to go through a herd. Use carbolic acid and quicklime.

94. Some years ago not one of my herd escaped; isolated, used chloride of lime and air-slaked lime. Animals not disinfected.

95. (Veterinarian) Know of several herds in which abortions have been frequent. Whitewash stable containing five per cent. carbolic acid. Use chloride of lime.

96. Eight cases last winter. No treatment except air-slaked lime.

97. Cases of abortion; no disinfectants.

99. Introduced into my herd by purchased cow.

100. Several cases a few years ago. Sulphur.

102. Abortions for six years prior to 1894. Disinfect stables, isolate aborters; disinfect the seemingly well cows. Use Parke, Davis & Co. antiseptic tablets.

103. Three cases; no treatment; no disinfectants.

104. Introduced into herd several years ago by bought cow. Sold the worst cows and got clear of trouble.

105. One case in locality; chronic aborter. No disinfectants.

106. Eight cases in herd of twenty during last nine months. No disinfectants.

108. Three cases, due to injury. Spray creolin solution.

109. One, from a strain. Chloride of lime and crude carbolic acid.

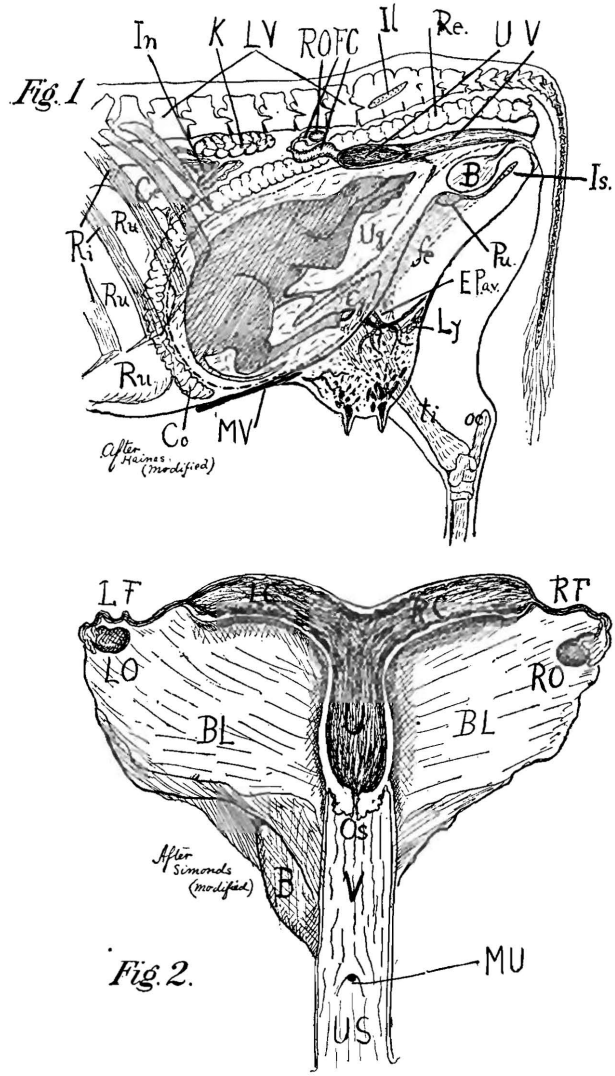


Fig. 1.

Fig. 2.

PLATE I.

EXPLANATION OF PLATE I.

Fig. 1. Diagram of the hinder portion of a cow, viewed from the left side, to show the location of the generative organs relative to their surroundings. The womb or uterus is shown in two conditions: at *U* it is represented in the unimpregnated condition, at *Ug*, near the close of the period of gestation, when it contains a fully-developed fœtus. The udder, uterus and vagina are represented as having their left sides or walls removed. *Ra*, ribs; *Ru*, paunch; *Ce*, cæcum; *In*, small intestines; *K*, kidney; *LV*, loin vertebræ; *ROFC*, ovary, Fallopian tube and horn of the right side of the uterus respectively; *Il*, place of attachment of left hip bone to the sacrum; *Re*, rectum; *U*, uterus; *V*, vagina; *Is*, *Pu*, section of ischial and pubic bones forming the floor of the pelvis; *B*, bladder; *fe*, thigh bone of right leg; *ti*, shank bone; *oc*, hock bone; *EP.a.v.*, external pudic artery and vein of udder; *Ly*, lymphatic glands of udder: the black spaces are the milk cisterns, supplying the teats; *Mv*, milk vein; *Co*, colon; *Ug*, uterus at full term; *Cg*, one of its horns.

Fig. 2. Diagram of the generative organs of cow, viewed from above; the upper wall has been cut away to show the cavity of the uterus *U*, and vagina *V*. The left and right Fallopian, tubes or oviducts are designated *LF* and *RF* respectively; *LC*, *RC*, left and right horns of uterus, *LO*, *RO*, left and right ovaries; *BL*, broad ligament; *B*, bladder, slightly pushed to the left side: *Os*, neck and mouth of the uterus; *MU*, opening of bladder into the vestibule of the vagina or urogenital sinus, *US*.

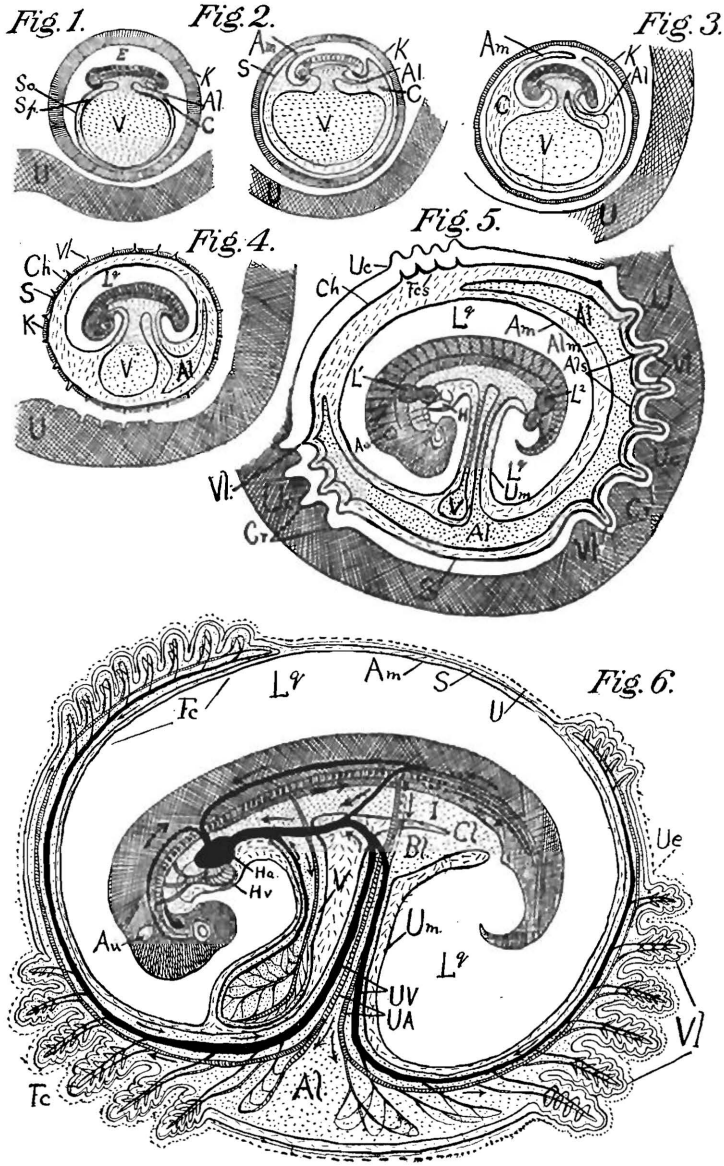


PLATE II.

EXPLANATION OF PLATE II.

Diagrams to show the organs of attachment of the fœtus to the womb. In all the figures the interior of the intestine and of the sacs that bud from it is dotted. The body cavity and the spaces that originate by its extension are marked with bacilli.

Fig. 1. Section of egg at an early stage of development. *E*, embryonic calf; *K*, egg shell (zona radiata); *U*, uterine wall; *V*, yolk sac; *C*, body cavity; *So*, body wall; *Sp*, intestinal wall; *Al*, bladder.

Fig. 2. Shows the egg at a later stage, when the amniotic folds, *Am*, are growing out and around over the back of the embryo; *Al*, growth of the bladder to form the allantoic sac.

Fig. 3. In this stage the amniotic folds have nearly met and closed in above the embryo.

Fig. 4. The amniotic folds have united. The sides of the folds next to the embryo now form a complete sac, inclosing it except at the belly. This sac is the true amnion and contains a fluid, *Lq*. It is the "bag of waters." The outer walls, *S*, of these folds are now continuous as a sac around everything. They lie next to the egg shell and replace that vanishing structure. This outer sac or new shell membrane grows out into small projections or villi, *Vl*, and is henceforth named the chorion, *Ch*. The villi are destined to grow down into pits (crypts) in the uterine wall. These are developed on certain thickened areas called cotyledons. The yolk sac is growing smaller and will ultimately be absorbed.

Fig. 5. The allantois has now grown extensively. Its outermost wall, *Als*, grows into the villi, *vl*, which in turn enter the uterine crypts, *Cr*, on the uterine cotyledons, *Uc*; opposite these cotyledons the fœtal cotyledons, *Fcs*, of the placenta are formed. *Alm*, the inner wall of the allantois, will unite with the amnion, *Am*. The yolk sac, *V*, is nearly absorbed. The fore legs, L^1, and hind legs, L^2, are shown in nearly their earliest form. That part of the amnion which incloses the yolk sac stalk and the stem of the allantoic sac forms the navel string, *Um*. At *Au* is the beginning of the ear; *H*, heart.

Fig. 6. Diagram to show the fœtal circulation; the legs have been omitted for sake of clearness. The black vessels are veins, the barred ones are arteries. The latter carry the blood away from the heart to the villi, the former return it to the heart. The arrows show the direction of the blood stream. The amnion now lies close to the cherion except for the area where the sac of the allantois separates the two. (In the mare the amnion is separated everywhere by the allantois.) *Um* is the navel cord, made very broad on purpose to show all the organs contained in it; *Fc*, fœtal cotyledon; *Lq*, cavity of the amnion; *Am*, wall of the amnion; *S*, wall of chorion; *Vl*, villi; *Al*, allantois sac; *Au*, ear; *Ha*, *Hv*, auricle and ventricle of heart; *V*, yolk sac; *Ua*, *Uv*, umbilical arteries and veins; *Um*, nave lcord; *Bl*, bladder; *I*, rectum of intestine; *Cl*, cloaca; *Ue*, dotted line, represents the uterine surface.

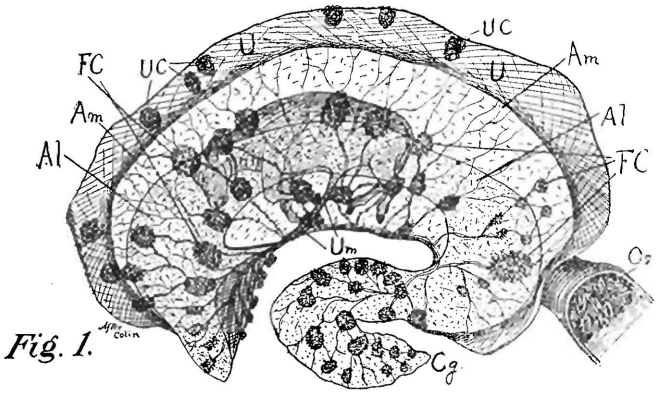


Fig. 1.

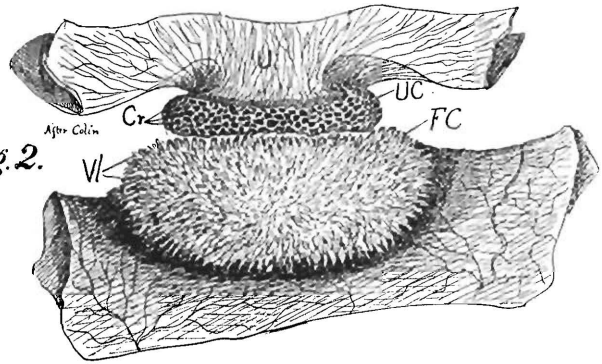


Fig. 2.

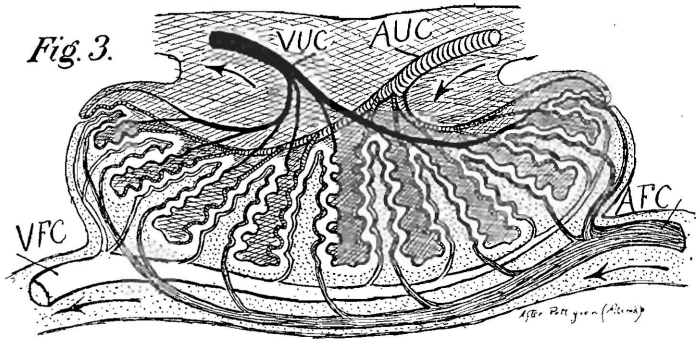


Fig. 3.

PLATE III.

EXPLANATION OF PLATE III.

Fig. 1. Uterus opened from left side to show calf at five months, enveloped in its membranes, on whose surface are seen the fœtal blood vessels. *U*, wall of uterus turned back and carrying cotyledons, *Uc*, into which corresponding fœtal cotyledons, *Fc*, fitted; *A*, amniotic sac; *Al*, allantoic sac; *Um*, navel cord; *Os*, mouth of uterus; *Cg*, one of the horns of the uterus.

Fig. 2. Fœtal cotyledon, *Fc*, pulled out of the uterine cotyledon, *Uc*. The latter contains the crypts, *Cr*, the former the villi, *Vl*.

Fig. 3. Diagram to show the relation of the fœtal blood circulation in the villi of a fœtal cotyledon to the uterine blood vessels in the walls between the crypts. Veins are black and arteries barred in the maternal circulation and veins are shaded and arteries white in the fœtal circulation. It will be seen that the two circulations are distinct. All oxygen and nutriment which the calf receives from the mother has to soak through the membranes separating the two systems. This fluid while on its way from the maternal to the fœtal vessels is the cotyledonous "milk" in which the germs of abortion especially multiply. *AUC*, uterine arteries; *VUC*, uterine veins; *AFC*, fœtal arteries; *VFC*, fœtal veins.

CONTAGIOUS DISEASES OF ANIMALS.

CONTAGIOUS DISEASES OF ANIMALS.

In compliance with the law placing contagious diseases of animals under the supervision of the State Board of Health, the following report of cases to which attention has been called during the year is submitted :

TUBERCULOSIS.

Since the formation of the special Tuberculosis Commission of the State Board of Agriculture, it has been the custom to refer all cases of this disease to that department. Ten cases have been reported to us, and in all but one instance the parties reporting have been directed to apply to the Commission or the reports have been taken directly to Mr. Franklin Dye, Secretary of the Commission.

One case was reported as pleuro-pneumonia, but physical examination gave negative results.

ACTMOMYCOSIS. (Lump-Jaw.)

Our aid was sought in dealing with several cases of this disease, which were discovered in the stockyards in Jersey City. The city health officer was uncertain as to what powers were conferred upon him in such cases. As the animals were in transit and not to be slaughtered for use in Jersey City, no ordinance of the local Board of Health was found that would apply to the case. After examining the law carefully and getting the opinion of two veterinarians that the disease was not contagious, the matter was left in the hands of the United States Government Inspector stationed in Jersey City, with the request that he should notify the health officer of any city to which the animals should be shipped.

HOG CHOLERA.

Three reports have been received as to this disease. On account of the uncertain knowledge as to methods of dealing with hog cholera, nothing has been done to assist those suffering from losses. The number of deaths of hogs during the past year has not been as great as in 1896, but the loss is still a serious one, and the United States Government is giving the matter careful consideration. Until some definite form of treatment is discovered, the only method of limiting the spread is by isolation of the affected animals and a disinfection of premises where the disease has occurred.

Several complaints have been received to the effect that some individuals have killed swine affected with cholera, and offered them for sale. Such action is a violation of the laws relating to the adulteration of foods and drugs, and should receive prompt punishment.

SPINAL MENINGITIS.

A report was received from Millville stating that one individual had three horses suffering from this disease. Two of this number recovered and the other animal died.

HYDROPHOBIA. (Rabies.)

A horse owned in Springfield was bitten by a rabid dog, and Dr. W. Runge, of Newark, made an examination. The animal was kept apart from others, and although the case was reported in August the animal was not destroyed until November, as the symptoms did not develop for that length of time.

Several dogs were destroyed in Elizabeth suffering from rabies, and laboratory examination confirmed the diagnosis of the disease.

Two hogs owned near Sykesville were reported as having hog cholera. Dr. Harker, V.M.S., of Trenton, examined these animals and, as they had been bitten by a rabid dog, was of the opinion that the disease was rabies and not hog cholera.

GLANDERS.

During the year forty-one cases of this disease have been reported. Seven, upon examination, were excluded as not having the disease. Thirty-four of the horses have been destroyed and the premises disinfected.

Ten cases were reported from Jersey City. As a number of the cases occurred in Newark we insert the report of W. Runge, D.V.S., as to cases under his supervision.

November 8th, 1896, Mr. Charles Schilling, No. 31 Komorn street, Newark, N. J., reported a horse suspected of having glanders. Upon examination, I found that his horse, as well as Mr. August Baukistel's horse, kept in the same stable, showed symptoms of the disease. In response to a telegram to you, a mallein test was directed to be made, which was done November 9th, 1896. The post mortem made November 11th proved chronic pulmonary glanders in Mr. Schilling's big horse and an acute infection of Mr. Baukistel's horse.

On November 20th, 1896, I received a telegram directing me to visit the Jersey City stockyards to examine some cattle affected with actinomycosis. After a conference in the Board of Health office with the Jersey City health officer and the veterinarians of the Bureau of Animal Industry, the animals were turned over to the United States Government officers.

November 29th, 1896, I found a case of glanders in the stable of George McGrath, No. 17 Hunterdon street, Newark, N. J. The animal, a brown horse, sixteen years old, was killed. At the post-mortem made November 30th, 1896, the animal proved to have pulmonary glanders and farcy. The stable was disinfected. The animal had been purchased from E. J. Tompkins, No. 345 Warren street, Newark, N. J., whose stable is located at No. 19 Hunterdon street. His stable was also disinfected. Mr. Tompkins' two other horses did not show any symptoms of the disease.

On December 29th, 1896, Peter Ballantine, Freeman street, Newark, N. J., reported a horse with glanders. The animal was killed, with the firm's consent. The post-mortem showed an acute case of glanders. The stable was disinfected, and a general examination of the eighty horses in the large stable, made January 1st, 1897, resulted in quarantining five horses. The mallein test made on these five horses, at the firm's expense, showed negative results.

On May 4th, 1897, Dr. J. T. Glennon, No. 146 Summer avenue, reported a suspicious case of glanders in the stable of Mr. George Lessley, No. 211 Berkeley avenue, Newark, N. J.

The mallein test, made May 5th, showed a local and general reaction. The post-mortem, made in the presence of Dr. Glennon, proved the existence of pulmonary glanders.

Mr. Lessley disinfected his stable according to instructions. His other horse is in a healthy condition.

On June 20th, 1897, I went to Plainfield, in consultation with Dr. Lockwood, of Woodbridge, to examine some cases of glanders in that vicinity. Two animals were destroyed.

On August 2d, 1897, I went to Springfield, at your request, to investigate a complaint sent by Stephen Woodruff, Township Clerk of Springfield township, Essex county, N. J., about a horse belonging to Theodore Reeves which had been bitten by a dog supposed to be affected with rabies.

On August 6th, 1897, Dr. J. W. Hawk notified the Newark Board of Health that there was a horse suffering with glanders in the stable of James Peters, Sherman avenue and Earl street, Newark, N. J. Upon investigation I found two horses affected with the disease, one of them in a dying condition. I served quarantine notice, which has been removed since The owner consented to have both horses killed, and the post-mortem proved chronic pulmonary glanders in both cases. The third horse was removed to a shed near the premises and the mallein test gave negative results. Mr. Peters has no water supply on his premises, and used the public watering fountains up to the last day. I had the three nearest his place turned off, disinfected and repainted before being used again.

August 7th, 1897, A. Gauch, Chestnut street and Elm road, Newark, N. J., reported a gray mare affected with glanders. The animal was killed, and the post-mortem made August 8th, 1897, proved chronic glanders and farcy. The quarantine was served, but has been removed since. The stable was disinfected under the supervision of the local Board of Health. The other animals, two mules and one bay horse, did not react on mallein test made August 11th, 1897, by your order.

August 9th, 1897, Dr. O. Leis, V.S, reported a case of glanders at Mr. Fitzpatrick's, No. 150 Thirteenth avenue, Newark, N. J. The owner agreed to have the animal killed. The post-mortem made the same day, in the presence of Dr. O. Leis, showed acute glanders. The stable was disinfected at once. The remaining five horses are in a healthy condition.

August 12th, 1897, Dr. O. Leis, No. 38 Frederick street, notified me that he had a case of glanders in his own stable. The animal, belonging to an Italian named Delissa, No. 60 Jackson street, was brought to him the night before as a patient for treatment. The post-mortem showed acute glanders. The other three horses of Delissa were apparently in a healthy condition. Delissa's, as well as Dr. O. Leis' stable, was disinfected. Mr. Delissa had the diseased animal kept in a New York stable previous to bringing it to Dr. O. Leis' stable. I sent the particulars to the New York Board of Health

On August 14th, 1897, a report came to me that Robert Kaelber, No. 59 Green street, had a glandered horse. Upon examination, I found a gray mare, submaxillar glands swelled on left side of left hind leg, twice the size of the other one, and dark reddish injection of the mucous membrane of the nostrils. I advised the owner to keep the animal separated. A second examination, made five days later, showed that most of these symptoms had disappeared and the animal was improving.

In the evening of August 19th, 1897, the Society for Prevention of Cruelty to Animals arrested Charles Shanbacher, No. 90 Wilsey street, for driving a horse covered with sores and in a dilapidated condition. Clayton & Hoff, liverymen, refused to take the animal in their stable, so a constable tied it to a post in the old graveyard on Broad street. On the morning of August 20th I made an examination and found that the horse had glanders. The post-mortem verified my diagnosis. Mr. Shanbacher, the owner, has left town, and I have been unable to find out where the animal came from; therefore no disinfection has been done.

August 21st, 1897, Mr. B. Kolbert, a vender, was stopped with his horse and wagon

and turned away from the market by the market clerk, claiming that the horse had glanders. The animal was suffering from bronchial troubles.

August 26th, 1897, Dr. J. Little, 396 Broad street, reported a case of glanders at a Mr. C. Lantz's stable, Bloomfield avenue. After reporting the circumstances a mallein test was ordered, which was made August 30th, showing negative results.

On August 27th, 1897, I received a telegram, directing me to go to Bloomfield at once, to meet Dr. Harrison, V.S. I found a horse belonging to Mr. E. J. Clark, a contractor, suffering badly from purpura hæmorrhagica with symptoms of glanders. The owner was willing to have the animal killed. The post-mortem, made in the presence of Dr. Harrison, proved the case to be one of pulmonary glanders, and the premises were disinfected. The other horses in the stable proved to be healthy.

August 29th, 1897, Dr. Kaiser, V.S., reported a case of glanders at Loehenberg's stable, No. 71 Wilsey street. Upon examination I found that there were reasons for suspicion, and therefore advised him to make a mallein test. On August 30th, 1897, the doctor reported negative results.

On August 31st, 1897, the market clerk stopped at the public market a glandered horse owned by Mr. C. Gross, Sixth avenue and Thirteenth street. Upon examination I found nothing but chronic bronchial catarrh.

On September 2d, 1897, Mr. C. Hauk, North Arlington, N. J., reported to me that he had glanders at his place, and that Dr. W. J. Fredericks, V.S., Franklin avenue, Delawanna, had killed one of his horses on that account. By your orders I went to Mr. Hawk's farm September 4th, 1897, but was unable to find any trace of glanders. The animal killed had been kept from June 4th to August 27th, 1897, at the place of Mr. Haffendorf, No. 25 Paterson avenue, South Rutherford, N. J. As Dr. Fredericks claims, positively, that the horse he killed had glanders, I induced Mr. Hawk and Mr. Haffendorf to have the premises disinfected.

It is our custom in all cases of glanders where there is any doubt as to diagnosis to have the mallein test applied, but where the case is clear to a competent veterinarian, the animal is destroyed without further delay.

In all cases animals that have been exposed are examined and kept under surveillance for several days. Premises are always thoroughly disinfected, and in many instances mangers, floors and side partitions of infected stalls are torn out and replaced.

The year taken throughout has been one in which the contagious diseases of animals have caused less loss than is usual. This is due to a better knowledge on the part of owners of the necessity of at once notifying the proper authorities as to the existence of the disease, and a willingness to co-operate in every way in limiting its spread.

FERTILITY OF THE LAND.

BY E. B. VOORHEES,

Professor of Agriculture and Director State Experiment Station.

FERTILITY OF THE LAND.

Mr. President and Gentlemen—You know your Secretary as well as I do, and you know he always knows just what people want. He is responsible for a great deal you will hear this afternoon. This is a sort of bell-wether address. [Laughter.] He said he wanted me to prepare a paper; I asked him what about. He said he did not care what it was about, but must have it. You have it right here, and, no matter what you may think of it, bear in mind he is responsible for it. [Laughter.] My subject is "The Fertility of the Land."

In a discussion of this subject at this time and before such a representative body, I am satisfied that the need is not so much for statements of underlying principles, as to point out the importance of their application in our everyday business of farming. To be sure, we must have the principle upon which to base our action, but that stated and clearly understood, the chief thing is to know what to do with it.

In this matter of soil fertility, so all-important, not only to the farming industry, but directly or indirectly to all others, and thus possessing an interest for all classes, whether they know it or not, the first question that interests us is: What is it? What constitutes this peculiar thing called "fertility," upon which so much depends? Is it an evanescent substance that must be coddled and handled with the greatest of care, it order that it may not escape? If so, the next question is: What becomes of it? What means this continual discussion concerning the exhaustion of soil? Are we as a nation of farmers not only losing by natural means, but willfully wasting, the real capital stock of our country? Do we, as individual farmers, lack in our appreciation of this "something," which measures our greatness as a nation? For we are to remember that the primary source of our wealth is in our land. If this view be either true or false, it is in any case worthy of our careful study, and if it be a matter of such great importance, as we are sometimes led to believe,

we should know not only *how to use it*, but *how to use it most economically*, and if the need exist, and it frequently does, particularly in the East, we should know how to increase it. The discussion of this subject is, therefore, naturally divided into four distinct parts:

I. What is fertility?
II. What becomes of it?
III. How shall it be used to the best advantage?
IV. How shall it be increased?

I. WHAT IS FERTILITY?

With this general and cursory view of the possibilities of this something called "fertility," let us look for a moment at the first point—what is it? Webster says "it is the quality of being fertile, and that to be fertile is to be productive," which simply leads us to inquire for a more detailed definition of the term and to study more closely the conditions which cause productiveness. In the first place, a soil must contain those elements found in the plant; hence it is almost self-evident that a fertile soil must contain an abundance of those elements or constituents which are likely to be reduced below the point of profitable cropping by the continual growth and removal from the land of the crops grown, and it has been demonstrated by careful experiments that the number of elements is limited in many cases to three and at most to four, viz., nitrogen, phosphoric acid, potash and lime, the latter only in exceptional cases. It has also been shown that it is the one which exists in minimum amounts which measures the fertility in this respect, as one cannot be substituted for another. We know, however, that there are soils so rich in all of these elements that if the crops depended upon them alone it would require centuries to exhaust them, while actually they are now incapable of producing a single profitable crop of cereals, fruits, grasses or other general products of the farm. It is evident, therefore, that the elements of fertility in themselves are not sufficient to constitute what we understand by the term—fertility is not measured by them alone; associated with them there must be other conditions. That is, while crops cannot be grown without these elements, however favorable other conditions are, it is the conditions which surround them that measure the power of the crop to secure them. For

example, water is absolutely essential both for the solution of these elements in the soil and for the distribution of the food in the plant after it has been acquired. The temperature both of the soil and surrounding air is another prime factor; as the changes which go on both in the soil and in the plant are influenced by it, and hence the location has an important bearing upon the productive powers of any soil. With these attributes still others are necessary, chief among which is the susceptibility of the soil particles to the action of these agencies, and if its original character is such as to readily give up its constituents, whether hard and compact and impervious to water, air and warmth, or whether open and friable, and freely admitting these agencies. Besides these there are many other minor properties which together constitute what is understood as "condition."

Furthermore, fertility even in this true sense may be useless, because of the location of the land which possesses it. For example, there are many localities on this continent in which sugar cane will grow to perfection, because the soils are very rich in the fertilizer elements, and because the surrounding conditions are most favorable, yet because of their location, it is unprofitable to grow sugar. In the first place, they are so situated as to make it impossible, or impracticable, at any rate, to provide the means necessary to convert the sugar-producing crop into actual sugar; and in the second place, even if it were possible to do so, the distance from shipping stations and from markets so increases the cost of transportation as to make it unprofitable to compete in the market with that grown upon lands possessing true "fertility" in a lower degree.

Practical fertility is, therefore, dependent upon many conditions, and fortunately our own country possesses them all in a marked degree, that is, the utility of the potential fertility, as represented by the total mineral content of our soils, is such as to make us one of the greatest agricultural nations in the world, both in the quantity and variety of the products grown. Our soils possess the essential elements in lavish amounts, and our climate permits of its easy conversion into a wide series of valuable products, and our location and facilities for handling and distributing our produce are such as to enable us to compete with any market in the world.

There is an element of danger, however, in the possession of this great natural wealth, lest it not only beget but foster national and

individual carelessness, since frequently carelessness is the common attribute of great abundance. This suggestion will, however, receive attention later in the discussion.

II. WHAT BECOMES OF OUR FERTILITY?

Since fertility is dependent upon so many conditions, or in other words, since the essential elements of fertility are dependent upon their utility, and since in this sense it is largely determined by natural conditions, it is pertinent to inquire, first, whether under present systems of management or mismanagement of the land, it is suffering any natural loss. As already pointed out, the most important function of fertility is to furnish nitrogen, phosphoric acid and potash, and since the content of these in our soils, together with the knowledge we have as to their use, measures in a sense our prosperity as an agricultural people, the possibilities of losing them from the soil is a matter of national importance, and of vital interest to individual farmers, who in the aggregate make up that part of the nation directly affected by the results of such loss.

It would perhaps be possible by a careful chemical survey of our soils to determine both the actual and potential fertility of our entire country, and this, together with an accurate measure of the intelligence exercised in its use, would enable us to safely predict our future development, if present methods were continued. That is, whether it would become barren and worthless, as has been the case in many older countries, which at one time were quite as productive, or whether it would constantly increase in productiveness, even with continuous and profitable cropping.

I do not wish to be regarded as an alarmist, for, because of our enormous resources, I believe that there is no immediate danger of our country as a whole, or in any part, becoming sterile, yet my observation and study have strongly convinced me that a real danger confronts us. It is now recognized by a few—the time is not far distant when it will be realized by many. Unless the apparent apathy of the producer, who is directly interested, the lethargy of the masses, who are directly interested, and the insensibility, or perhaps better, senselessness of the average legislator, who in his attempts to appear to be both directly and indirectly interested, fails to repre-

sent anything, are awakened to a proper sense of the situation, disaster will sooner or later overtake us, because of our wasteful management of our fertility given us for the purpose of rightful use.

SOURCES OF NATURAL LOSS OF NITROGEN.

In the first place, then, let us inquire as to the natural sources of loss from our land of the essential constituent elements, not absolutely lost, because in nature what appears to be loss is a change of form and place, rather than loss, but in this case it is equivalent to an actual loss, because no future benefit is derived from at least a part of those that have escaped, though placed there for our use.

Of these constituents, nitrogen is, in one sense, of the greatest importance, because it is the one that is more liable to escape than the others, and because it is more expensive to supply, artificially, than are the minerals. It is more liable to escape, because it is an element that is available as plant-food largely in proportion as it changes to a nitrate, and inasmuch as after it assumes this form, it is seldom absorbed or fixed in the soil. In this form it remains freely movable and the possibility of loss from leaching is very great, and the possibility of loss is increased in proportion to the lack of preventive measures, or the presence of those conditions which favor leaching. The latter may be classified as follows: First, the amount and time of the rainfall; second, the character and absorbing power of the soil and subsoil, and third, the amount of vegetation of the soil affects the passage of water through them. While the amount and time of rainfall cannot be controlled, its effect upon our soils in this direction can be largely governed if proper attention is given to correcting the other conditions which may be largely modified, if not controlled. In the matter of the absorbing and retentive power of soils, it has been shown that if they are well supplied with vegetable matter and carefully cultivated, they retain and hold the plant-food constituents in a much greater degree than if devoid of humus and improperly managed, and also that the drainage waters from soils upon which crops are growing seldom contain more than the merest trace of nitrates. The addition of vegetable matter and good cultivation are conditions that are within the power of all farmers to provide, though it is sometimes impracticable to keep the land continuously covered with a crop, and sometimes it is thought that the loss thus incurred is more than bal-

anced by the gain in other directions. The importance of these precautions is apparent and has been frequently demonstrated. For example, it has been shown by carefully-conducted experiments, both in this and other countries, that in a season of average rainfall, the drainage waters carry away from one acre from uncropped soils, and only fairly rich in plant-food, as much as thirty-seven pounds of nitrogen per year, while when continuously cropped, the drainage waters from the same soils contain practically no nitrogen. This difference in the loss of nitrogen under the two conditions may not seem so serious a thing at the first glance, but when we consider, first, that the amount of possible loss, annually, is practically equivalent in nitrogen to that contained in two tons of timothy hay, or in one ton of either wheat, rye, oats, corn or buckwheat, quantities nearly double the average yield per acre of these crops throughout our whole country, and second, that the nitrogen which is carried away by the drainage water is in the very best form for feeding the plant, or it would not have been lost, and thus leaves the soil not only poorer in the constituent elements, but poorer in the sense that the remainder in the soil is in a less useful form—"he who runs may read" the danger in this direction. Assuming that one-tenth of the arable land in our humid regions is lying fallow or uncropped, particularly at those seasons of the year when our rains are usually the heaviest—early spring and late fall—the amounts that might be carried away by this means would reach enormous totals, measured by tons rather than pounds. In fact, in many sections much more than one-tenth of the arable land is void of vegetation nearly six months in the year, and the losses are recognized as a serious matter. It is in those sections that the fertilizer agent reaps a rich reward.

Another source of natural loss of nitrogen is its escape as gas into the atmosphere, and is due to oxidation of the vegetable matter, or to "denitrification," and it takes place very rapidly when soils rich in vegetable matter are improperly managed. The possibilities of loss in this direction are strongly shown by investigations carried out at the Minnesota Experiment Station on "the loss of nitrogen by continuous wheat-raising." The results of these studies showed that the total natural loss of nitrogen, annually, was far greater than the loss due to the cropping. In other words, by the system of continuous cropping, which is universally observed in the great wheat fields in the Northwest, there were but twenty-four and five-tenths pounds

of nitrogen removed in the crop harvested, while the total loss per acre was 171 pounds, or an excess of 146 pounds, a large part of which loss was certainly due to the rapid using up of the vegetable matter by this improvident method. Whereas, on the other hand, when wheat was grown in a rotation with clover, the gain in soil nitrogen far exceeded that lost or carried away by the crop. It is said that the trend of civilization is westward; the center of agricultural production is also moving westward, and close in its wake is the fertilizer agent—he has reached the Mississippi river, and is selling nitrogen in the regions formerly believed to possess inexhaustible fertility—a result due in large measure to the losses of this element by continuous wheat and corn-growing, and to improvident methods of preparing the soil for these crops. In the Southern States, continuous cropping of cotton and tobacco is also responsible for untold losses in this expensive element of fertility, while in nearly every State of the Union, soils both rich and poor are suffering more or less from the effect of natural losses in this direction.

THE NATURAL LOSS OF THE MINERAL ELEMENTS.

In the case of the minerals, phosphoric acid and potash, which exist in fixed compounds in the soil, the actual losses are undoubtedly very much less than is the case with nitrogen, since only traces of those constituents are ever found in solution in the drainage waters under ordinary circumstances, yet because of the large quantity of water that passes through many of our soils, the total amount of these rendered soluble and carried away by this means is very great. Our great rivers carry in solution into the ocean tons upon tons annually of these elements of fertility, and it is an absolute loss, as there is no natural means by which these may be returned to the soil, as is the case with nitrogen, and, as is the case with nitrogen, the soil is poorer by virtue of this loss not only in its elements of fertility, but in the immediate utility of the remainder. These silent and unseen forces, constantly at work, are reducing the content of these constituents of our soils to an alarming degree, and it is because they are unrecognized that the results of their activities are not appreciated, and consequently are largely restrained.

LOSSES DUE TO MECHANICAL MEANS.

In the second place a great natural loss of all of the fertility elements is due to mechanical means; aside from the amounts the rivers of water are carrying in solution to the sea, they are carrying tons upon tons in suspension. In some sections these are restricted because they are apparent, yet the gullied and barren hillsides are standing monuments to our folly, and mute witnesses of our improvidence. The results are painfully evident in many of the Southern States, and in sections where the forests have been removed and the land abandoned, the soils have been washed and gullied until not only the very best portions, but in some cases the largest portions, have been lost.

ARTIFICIAL LOSSES OF FERTILITY.

In addition to these natural losses there are the artificial losses, or those due to the removal of crops. These, of course, necessarily accompany all farming operations, and provided that, in the removal and sale of the constituents in the form of crops, the farmer has received a fair price for them, they are legitimate.

The sale of farm products is really, in the last analysis, a sale of actual constituents, together with a certain portion of the "condition" of our land, which is not readily measurable—that is, it is the constituents in the soil, together with the conditions surrounding it, that the farmer buys when he buys land. If an acre of land containing within the reach of the plant-roots, say 3,000 pounds of nitrogen, 5,000 pounds of phosphoric acid and 6,000 pounds of potash salts sells for $100, the seller receives the $100, not for so much dirt, but really for the constituents contained in it. The purchaser believes that, with the conditions surrounding them, he can convert them into products which he can sell and realize a profit. If, in selling the same quantities of these constituents, a lower price per acre is received, it is because the natural conditions which surround them and which influence their utility are less favorable, and a greater proportionate effort is necessary to secure them in the form of salable products. At the price per acre and for the amounts here given, the buyer would pay at the rate of one and one-half cents per pound for the nitrogen and one-half cent per pound each for the phosphoric acid and potash, and it now constitutes his capital stock.

A comparison of the prices paid with the prices received for the various constituents in the different crops, disregarding for the moment the value of the "condition," will make this matter of rational sale, which represents a reduction of our capital stock, clearer to us. If, for example, wheat is raised and sold for 60 cents per bushel, or $20 per ton, the nitrogen sells in this form for 41 cents per pound, and the phosphoric acid and potash for 14 cents each per pound. That is, the 60 cents per bushel, or the 41 cents received for the nitrogen and the 14 cents for the potash and phosphoric acid represent what has been received per pound for the capital stock of these elements. The labor in raising the crop, the expense of harvesting and putting it upon the market, and the profit must come out of the difference between what is paid and what is received. Naturally, as the ratio between the constituents contained in the products sold and the price received is increased, the rate of income per unit of exhaustion is increased, though in many cases the increased cost of the labor necessary is is proportion to the increased price received. This may be illustrated by a comparison on the fertility basis of the sale of wheat and milk. In milk at $1.50 per hundred, nitrogen is sold for $2 per pound, and phosphoric acid and potash for approximately 70 cents per pound. In the sale of milk at this price, the rate of income per unit of exhaustion is increased nearly five times, though because it is a manufactured product, the cost of labor per unit is largely increased. Again, if cream is sold, the prices received for the constituents are still further increased, while if the milk is made into butter, which is sold, the prices received measure the expenses and profit, and the capital stock of fertility is not reduced, though in another form and in another place.

The losses of the constituents in the cereals and grasses are, too, relatively greater than in vegetables and fruits, as potatoes, sugar beets, apples, berries, &c., though in the case of the latter a higher degree of fertility is necessary in order to produce maximum crops, and the cost of production is again proportionately greater. I mention these points simply to emphasize the fact that these relations are worthy of careful consideration in determining our line of practice.

There are methods of practice which are entirely irrational and contribute to the real losses, because the prices received for the constituents in the crops are actually less than the prices that would

have to be paid for them, provided they were purchased in the open market in artificial forms, and these methods of practice are not confined to farmers whose lands of inexhaustible fertility have been given them by a generous government, but are followed by farmers who annually purchase commercial fertilizers to supply the losses of fertility thus sustained.

For example, in selling clover hay at $8 per ton, which is the market price at this time, the nitrogen brings but 14 cents per pound, and the phosphoric acid and potash but 4.75 cents per pound—prices for the constituents lower than is on the average paid for them in artificial forms. In selling timothy hay at $12 per ton, on the other hand, the nitrogen is sold at the rate of 40 cents per pound, and the phosphoric acid and potash at 13 cents per pound. That is, twice as much is received for fertility in a product less valuable as a feed, and but slightly more expensive to produce. I do not forget that the clover possesses powers of acquiring food not possessed by the timothy, and hence in one sense is less exhaustive, but claim that that fact does not have a distinct bearing upon this point. The fact remains that the loss of fertility due to artificial means by the sale of crops is largely measured by the knowledge of the producer concerning the relation between the price received and the fertility removed, and his intelligence in adjusting his methods so as to reduce to a minimum the actual loss. This is shown by his endeavor to sell the manufactured rather than the raw materials; that is, to so use his crude products as to lower the quantity of the constituents contained in those sold. The losses in this direction of our national capital stock are, however, not absolute, if the products are used at home, as more or less of the constituents contained in the crude products sold find their way back to the farm, either in the form of by-products of the mills, in sewage, in the manure from cities, and in various wastes, but when they are exported the loss is absolute, and the amounts so disposed of measure the rate at which we are losing our capital stock.

It is of interest in this connection to consider the losses of fertility in a few of our exports of both crude and manufactured farm products, which are rich in the fertility elements. In the last report of the statistician of the Department of Agriculture, it was shown that we exported in 1896, in round numbers, 400,000 tons of oil-meal, which included both linseed and cotton-seed, and for which we re-

ceived $8,000,000. It was purchased ostensibly on the basis of its value as a food, though this value was fixed by the export, and not by the home demand, but for the sum received we actually sold our fertility at ruling wholesale prices in this country for the same elements in artificial forms, viz., 15 cents per pound for nitrogen and 5 cents each for phosphoric acid and potash; we either lost our fertility absolutely, or we sold it at these prices and gave to the purchasers food equivalent in value to the $8,000,000 received. If we also look a little further in the same report, we find that we exported for the two years 1893 and 1894, which represent 6,000,000 tons of wheat and over 3,000,000 tons of flour; the flour represented in the wheat was a little more than was exported as flour, yet we received for the flour practically as much as for the wheat. Assuming that each ton of wheat contained as much fertility value as each ton of flour, though it contained slightly more nitrogen and less of phosphoric acid and potash, we received for the fertility constituents in the flour, nearly twice as much as for those contained in the wheat, for we retained from the wheat that is represented by the flour about 25 per cent. of the nitrogen, 50 per cent. of the phosphoric acid and 35 per cent. of the potash. The money received was practically identical, yet in the exporting of flour we exported, in the first place, only about one-half as much of our fertility as in the wheat; in the second place, we retained in the refuse from it, bran and middlings, food more than equivalent in value to that of the fertility constituents; and, in the third place, we contributed to the building up of our own industries by the manufacture of the wheat into flour, no inconsiderable item, considered in all its relations. The total annual loss of fertility in our exports of farm products is necessarily very great, yet the kind of product exported should be considered in its relation to the losses of fertility. The subject is worthy of our serious consideration, though it may not seem to touch us very closely as individuals.

While I am aware that it is frequently wise to beware of the man with "figgers," especially if they are accompanied by the statement "that 'figgers' won't lie," I am tempted to do this here in order to more strongly emphasize this point of fertility losses, due to our exports of raw material, rather than of finished products.

My figures show that there were contained in the exports of the products mentioned the following amounts: In the cotton-seed meal, 27,000,000 pounds of nitrogen, 12,000,000 pounds of phosphoric

acid and 7,500,000 pounds of potash; in the linseed meal, 22,000,000 pounds of nitrogen, 7,000,000 pounds of phosphoric acid and 5,500,000 pounds of potash; in the wheat, 228,000,000 pounds of nitrogen, 108,000,000 pounds of phosphoric acid, and 78,000,000 pounds of potash; in the flour, 132,000,000 pounds of nitrogen, 33,000,000 pounds of phosphoric acid, and 42,000,000 pounds of potash—or a grand total for one year of 409,000,000 pounds of nitrogen, 160,000,000 pounds of phosphoric acid and 123,000,000 pounds of potash. This amount of nitrogen is equivalent to that contained in 1,300,000 tons of nitrate of soda, the phosphoric acid is equivalent to that contained in three-quarters of a million tons of acid phosphate, and the potash is equivalent to that contained in 123,000 tons of muriate of potash—quantities of nitrogen far exceeding the annual output of nitrate mines of South America, of phosphoric acid equivalent to the amount of rock raised last year from the South Carolina deposits, and of potash more than an equivalent of the amounts contained in the fertilizers now annually used in the entire country. These are losses for which we have absolutely no return in the way of sewage, of manures, or of waste products of any sort. They are losses which if prevented would enable us to more cheaply produce those crops which contain the minimum of fertility, and for which we receive the maximum price, and not now grown because it costs us too much for fertilizer.

It is natural to infer that proper losses of fertility are confined to the removal of the constituents in the sale of farm products, and that those contained in the materials not sold and in the feeds used upon the farm are again returned to the land. Theoretically, this is correct, but the losses that do occur, particularly in the handling of manures, should not be overlooked. While it is impossible to even roughly estimate the waste or loss of fertility due to the improper making and handling of manures, some idea may be obtained when the enormous amounts produced and the sources of possible loss are considered. Resorting to "figgers" again, we find in the report of the statistician of the Department of Agriculture for 1896 that there are on farms and ranches in the United States, in round number 16,000,000 dairy cows, 31,500,000 oxen and other cattle, 16,500,000 of horses and mules, 37,000,000 sheep and 41,500,000 of swine. Assuming that the sheep and swine, as manure producers, are equiv-

lent to 15,000,000 dairy cows, which is a fair assumption, we have a total equivalent to 78,000,000 grown animals. It has been demonstrated by careful experiments that the amount of total excrement voided per year by a well-fed animal of 1,000 pounds live weight, reaches 10 tons, which would make a total of 780,000,000 tons for the entire number of animals. For sake of argument, we will assume that, on the average, the animals are in the field or on the ranges one-half of the time during the year, and that during this time all of the manure is returned to the land, but that during the other half of the year they are in the yards or barns. On this basis, a total of 390,000,000 tons of manure would be produced in the barns and stables. A ton of the mixed excrement should contain, under fairly-good conditions of feeding, an average of 10 pounds of nitrogen, 8 pounds of phosphoric acid and 10 pounds of potash, or total nitrogen equivalent to ten times the number of tons of manure, total phosphoric acid equivalent to eight times the number of tons and potash equivalent to ten timec the number of tons—amounts so large as to be scarcely comprehended. There is hardly a man of us, however, but that appreciates the value of a ton of good manure. We all think that we could use it to good advantage, and we know that if this enormous mass of waste material were properly used it would go a great way toward increasing our fertility or in retarding the time of exhaustion, and it is quite proper to inquire if it is properly used. It has been demonstrated by experiments at the Cornell Experiment Station that 50 per cent. of the total constituents in the manure is liable to be lost by ill-regulated fermentation and by leaching, and further, that careful observations and experiments show that the conditions in the majority of barnyards are such as to encourage the maximum loss by these means. It is morally certain that a large percentage of the constituents contained in them are lost. They never reach the right place on the farm.

Assuming that the constituents lost reach 50 per cent., and that they are in the same proportion as they exist in the original manure, the loss would represent sufficient to furnish each State east of the Mississippi river with 1,560,000 tons of a mixed fertilizer containing $2\frac{1}{2}$ per cent. of nitrogen, 2 per cent. of phosphoric acid, and $2\frac{1}{2}$ per cent. of potash, and which would cost each State nearly $20,000,000. The amount for each far exceeds the fertilizers now actually pur-

chased in any State, although the amounts that are purchased constitute a serious tax upon the farmers, particularly in the Eastern, Middle and Southern States. If but one-tenth of this waste could be prevented, and a very large part of it is practically preventable, and at a very slight expense, the total constituents possible to save for further use would be more than equivalent to the amounts now purchased in the form of commercial fertilizer, thus clearly demonstrating the serious drain upon our national resources, due to the lack of care in the handling of our manures.

I am well aware that to the average man statistical statements do not appeal very strongly, and to the average farmer or dairyman general statements are appreciated quite as little. My purpose, however, in pointing out our situation in this respect is to impress the fact that, while it is a matter that in one sense should directly appeal to the individual farmer, in another sense it reaches beyond him—it is also a national matter, and affects the future prosperity of the nation as a whole, or, expressed in another way, the prosperity of an agricultural nation is measured by the intelligence exercised by the farmer in using these natural resources, viz., the constituents of the soil, and that, therefore, while it is a national matter, it is also an individual matter, because it is the individual that is responsible for the enormous aggregate loss of fertility in the manures mentioned.

What has preceded but feebly indicates the losses of our chief possession, "the fertility of our land," and yet there are those who are either so thoughtless, or so selfish, or so narrow-minded, as to urge the point "that we now have too much fertility for our own good, and that its waste is a Godsend; we produce altogether too much, and therefore do not receive a fair price for our fertility and our labor." It is my mature judgment that it was a great mistake on the part of our government to divide our best land among corporations and foreigners, rather than to reserve it for the use of the descendants of those who by their lofty patriotism and the spilling of their life-blood thus made this free government possible, yet I do not believe that this is responsible for all our woes. I am satisfied that the chief trouble is due not so much to an over-production, *in toto*, as to lack of wisdom in the kind of production. It seems to me that an agricultural nation that will spend $358,000,000 annually for imported agricultural products, or 55 per cent. of the total expenditure for imports,

and largely for food products that can be successfully grown in this country, rather bears me out in this belief. Why do we spend $100,000,000 annually for sugar? Why other millions for barley, eggs, potatoes, cabbage, onions, fruits and a host of other products that we can grow quite as well ourselves? Is it because the German, the Englishman or the Frenchman has the advantage of us in that he is using free fertility obtained in our linseed meal, cotton-seed meal, wheat, bran and so on? Perhaps this is the reason, for we have already observed that enormous quantities of nitrogen, phosphoric acid and potash are given away in these products, and we certainly get nothing back in the sugar for which we pay $100,000,000.

III. HOW SHALL WE USE OUR FERTILITY.

In the discussion of the third point, I shall attempt to show how closely this matter applies to the individual farmer. The line of practice, whether it is the growing of the regular staples, wheat, corn, oats and hay, whether dairy farming, and the chief crops are Indian corn, clover and grasses, whether it is special and includes such crops as potatoes, tomatoes and other vegetables, or whether it is the growing of fruits and berries, is subject to the same natural laws though their effect may differ in degree. Assuming that farming on all these lines is practicable in one neighborhood, and under equal conditions as to character of soil, climate and market, all should be equally interested in making available and in conserving the fertility. Good cultivation should be practiced, since this practice not only increases the utility of the potential fertility in our soils but also improves their absorbent and retentive character, enabling them to hold for the plant the food thus made available. The lands should be constantly occupied with growing crops, because if left void of vegetation the danger of natural loss of the constituents is very great, reaching a possible maximum in nitrogen of forty pounds per acre, more than enough to supply the demands of the average crop. Rotation of crops possessing different powers of acquiring food and the seeding of catch-crops are, therefore, arranged in such a way as to accomplish two distinct objects, first, to extend the period of profitable cropping, and second, to take advantage of the beneficent provision of nature,

which enables an accumulation in the soil of nitrogen and of humus-forming material. It is readily seen, therefore, that the principles thus far involved, particularly in the conservation of our fertility or the prevention of natural losses, are common to all, whatever the character of the crude product.

In the matter of artificial losses, and the principle involved in the sale of minimum amounts of fertility at maximum prices, specific rather than general principles apply. For example, the old-line farmer can profitably sell a maximum of fertility for a minimum price, as he does when he sells grain, when his land is rich in all the elements of fertility, and when it has been purchased at a minimum price for the elements, and when the minimum of labor is required, while this practice cannot be followed with the same degree of profit on the poor and high-priced lands of the East, where fertilizers are required and labor is expensive.

The dairyman who converts his crude products into milk, cream, butter or cheese, and the stock-raiser who converts them into beef, mutton or pork, all articles of relatively high price, and which contain a minimum of fertility elements, can increase their profits from the transaction largely in proportion as they recognize that in the feeding of stock those foods which are the richest in fertility elements are the ones usually necessary to economically improve their rations, and thus by virtue of better feeding, the losses of fertility are not only prevented, but great gains are made.

In a dairy of 21 cows, of which I have full records for the past year, the fertility sold in the milk included 849 pounds of nitrogen, 318 pounds of phosphoric acid and 248 pounds of potash, yet the fertility on the farm was not reduced because in the feeds necessary to purchase, in order to properly balance the rations and thus to feed economically, there were contained 857 pounds of nitrogen, 640 of phosphoric acid, and 214 of potash, in excess of that sold in the milk—amounts of fertility elements equivalent to over $2\frac{1}{2}$ tons of nitrate of soda and acid phosphate, and to over 400 pounds of muriate of potash.

The manures thus made possess, in addition to their chemical and mechanical character, a biological function, and which recent discoveries have demonstrated to be very useful, contributing both directly and indirectly to the improvement of soils. It is to the

interests of the dairyman and stock-raiser, and it is their line of practice more than any other, to which we must look for a reduction in the loss of constituents by the exports of crude products. The farmers of the East should retain for their own use that which is now given to foreign farmers, and with which they increase the fertility of their soils, and thus are able to successfully produce a crop which we now import, and for which we pay millions of dollars annually, though it contains not an atom of fertility.

These examples, it seems to me, fully illustrate the responsibility resting with the individual farmer, and contain suggestions which, if followed, will result in profit.

HOW SHALL IT BE INCREASED?

While I realize that a discussion of so broad a subject is somewhat tedious, it seems to me that the fourth point, "How to increase in fertility," should be touched upon. I wish to emphasize particularly the fact that although losses are constantly encountered in the directions mentioned, that there are also natural sources of gain both of potential and of active fertility. The gain in actual fertility elements is confined exclusively to nitrogen, and this gain, as already intimated, is chiefly due to the power which plants belonging to the leguminosæ have of acquiring their nitrogen from "the inexhaustible stores of the atmosphere," as it is expressed by the Germans.

I shall not go into this matter in detail; suffice to say that under proper conditions, which are chiefly the presence in the soil of an abundance of the mineral elements, of the necessary bacterial life, and a reasonable deficiency of nitrogen, the gain of one crop from this source is often sufficient to supply the needed nitrogen to three or four other crops which depend entirely upon soil sources. The investigations of the Minnesota Experiment Station, already quoted, bear directly upon this point, and show that in growing wheat and clover in rotation, the gain in nitrogen far exceeded that lost by the removal of the wheat crop. While the various crops of this order cannot be grown everywhere, one or more can be grown successfully in any State, and the farmer should use to the fullest extent this method of increasing his soil nitrogen. The gain in active fertility

is due to the increase in the availability of the dormant constituents, and is accomplished chiefly by cultivation; this gain, of course, is confined to soils naturally rich in the mineral constituents. The possibilities in this direction are nicely illustrated by recent work at the Cornell Experiment Station and reported in Bulletin No. 140 on "Potato Culture." The matter of artificial sources of gain, or the use of commercial fertilizers, is a broad subject in itself, and in this connection, I desire to make just one suggestion, viz., that these consist exclusively of nitrogen, phosphoric acid and potash, and that the value of any product depends upon the quantity and quality of the one or more of these contained in it. This one thing, if fully appreciated by the farmers, would result in the saving of hundreds of thousands of dollars annually now spent for mixing, bagging, handling and shipping absolutely worthless material.

I desire to say, in conclusion, that in my judgment no one single factor will be more potent in correcting the present tendency towards wastefulness of our natural resources, and in enabling us to take advantage of both natural and artificial methods of increasing our fertility, than education, not alone as applied to the farmer, but to all classes of our citizens, particularly as to the relation of soil fertility and its use in the right development and progress of all other interests. The disastrous results of certain legislation, affecting our domain, now being felt in our whole country, are largely due to ignorance, not of the farmers, but of those who by virtue of improper education could not comprehend the relation of the conservation of our national capital in the fertility of our soil to the right development of other and allied industries, and thus misrepresented the true interests of the whole people. The safety of our future lies in education, and it behooves every one of us to encourage it in whatever form or direction it may take; it should begin in our public school, rural and city alike, and be continued in the academy, the college and the university. I say we should welcome and encourage all efforts in this direction. I have no patience with those who regard it as "special instruction," to be taught only in special schools of the higher grades. Our right development as a nation demands a knowledge of first principles, and these, so far as now well established, should be broadly disseminated, and the responsibility rests alike upon the individual, the State and the nation.

The Chair—There is much material for thought in the address just made by Professor Voorhees. We cannot appreciate it fully until we have gone over it carefully and thoroughly. I think it one of the most instructive papers we have heard.

The Secretary—In our Institute work this winter the point was made again and again that the farmers of New Jersey were losing, on an average, $60 per farm in the injudicious work referred to by Professor Voorhees. He has stated it in a different form and makes it $2,000,000 for the State. This is a vast amount of money. In the Institutes I put it at $1,800,000. This question of loss of fertility applies to every farm and to every farmer, and should receive most careful consideration. By so doing, what is now lost may be turned into a profit.

FARMING ON THE WESTERN PRAIRIES.

BY GEORGE T. FAIRCHILD, LL.D.,

Late President of the Kansas State Agricultural College.

EDUCATION IN THE DISTRICT SCHOOLS.

BY DR. GREEN.

President Denise—Ladies and gentlemen, through the kind invitation of Dr. Green, we have met here to-night, in the auditorium of the State Normal School, to listen to a lecture by Dr. Fairchild, but before beginning this we want to hear from Dr. Green. I think he was brought up on a farm, and I do not believe he has forgotten what his father taught him about farming. [Applause.]

Dr. Green—I think, ladies and gentlemen, although you will hardly consider me a representative of the agricultural classes, there is perhaps no one who has deeper sympathies with them than I have. It is true that I was brought up on a farm, and I have never had occasion to regret it, and while I have not had much experience lately, my sympathies are still strongly with those engaged in this great industry.

It may seem strange to you, but I follow farm conditions, and often wonder how certain conditions are affecting the farmers at the time. If the weather is too dry I cannot help wondering how it will affect the crops, and if there are too many showers I think of them also.

I may say also that if I wanted to deliver some learned remarks on this industry I cannot help but realize that there is a great deal more not known about it than there is known, up to the present time. I have sometimes thought that the general view of farming and of farmers, as held by the rising generation of to-day, needs revision, and this change can best be brought about in the education of the children in the district schools. In my judgment, no school needs more cosmopolitan direction than the rural district school, where the children of the farmers are educated. [Applause.]

During a visit to my father's farm, I got to musing on what I saw there, and as I looked over the threshing machine, and the reaper and the mower, the drill and the rakes, the harrows, ploughs, and the various farming implements he uses on his farm,

this thought came to me: There is no industry in this broad land of ours that does not concern the farmer. There is no manufacture of any class whatsoever that does not especially concern him in the carrying on of his work. There is no man that needs better to know the laws governing manufacturing than he does. There is no market so great as the market he affords them for their manufactured products. There is no industry upon which other classes depend so largely throughout as that of the farmer. It is clear, then, that the farmer's education should be widespread and cosmopolitan, and we have long felt in our work in the school here that whatever of sympathy could be shown in this direction should be shown them. [Applause.] I have not the statistics at hand, but I am satisfied if we send out pupils from our schools prepared to solve the problem of destructive insects we will save to the State more than the cost of her entire educational system at the present time. I am also satisfied if we could send out a class of teachers who could help solve the question of noxious plants in our soil, and how to get rid of them, we could save in this item more than the entire cost of our educational system at this time. In our district schools I know it is sometimes the custom to place in them teachers who are able to teach a little geography, a little grammar, spelling and the common school branches, but I believe if our farmers are to compete successfully in the markets of the world, they must know something of physical geography, and something of commercial geography. He must know something of the laws of transportation so that he may not be taken by surprise in his business. I remember, in my own time and locality, the valley known as "German Valley" was considered a wealthy farming district, dotted with mills, all doing a thriving business. Soon after a railroad was built through there, and the whole commercial industry was changed. Train loads of grain were brought in there to these mills cheaper than the farmers of the locality could raise it. This was brought about by changes in the conditions of transportation, so far as that locality was concerned.

Farmers, too, must be instructed in the question of fertility of the soil—the question of fertilizers—and this knowledge should be brought within the reach of every child in our rural schools. It is the greatest mistake in the world to educate but one class of people, for true education is suited to every class. True chemistry for one is true chemistry for another, and it seems to me that along these lines

our schools should co-operate with the farming industry. It is my earnest desire to have it so. I believe it is the desire that every teacher in the State should be intelligent enough to solve many of the problems of greatest value to the children of those who are interested in this great industry.

The heart of this institution will always beat warmly in sympathy with these friends of ours, and we are always ready to help you in your work of educating farmers and farmers' children. [Applause.]

FARMING ON THE WESTERN PRAIRIES.

BY DR. FAIRCHILD.

Mr. President, Ladies and Members of the State Board of Agriculture and of the State Normal School—In addressing a New Jersey audience upon western farming, I meet the difficulty of seeming, perhaps, a mere story-teller or, worse, a boomer of western lands. But, in the constantly-narrowing world, under modern systems of rapid and universal communication, every community takes interest in every other. We must all be cosmopolitan by feeling, at least, and in many particulars by information. The kinship of commercial interests, as well as that of blood, binds East and West together. But farmers of New Jersey have even nearer relations to farmers of the prairies. There is a certain sympathy of calling that makes of special interest the mode of life, the method of tillage, the crops and the profits of any other farmers.

Moreover, the prairie farmers have become, in a marked sense, competitors for business in your markets. They have long held these markets down to their level in the staple grain crops and the products of the packing-house. They are crowding now in fresh meats and dairy products. They occasionally compete in some of the more substantial fruits and vegetables. It seems evident that every farmer here is bound to feel this pressure upon the character of his business and to study the problem of adjustment, so that eastern farming and western farming shall be true complement of each other, to the advantage of both sections. All must remember that the world is ever advancing through finding a fuller supply for increasing wants, not by curtailment. Our civilization involves a ready adjustment to these improving circumstances.

A further interest is found in the constant drift from the crowding East to the comparatively empty West, in which the Jersey civilization finds its opportunity to leaven the great lump of humanity called the American people with some of its intelligence, thrift and earnestness. These young people need to feel the larger world that still

invites the young man to go West. And all must remember that room in the West for genuine home-makers implies room right here for a better and more profitable agriculture. The pioneer methods of the West may furnish the world with crude elements of civilization, but the capital and skill of the East can thus have the larger space for intensive and perfected agriculture.

I need not apologize, then, for bringing to your notice, in a rapid outline, facts of my own observation among a people kindred to you in blood, in business competition and in calling. Doubtless many of these facts have come to your notice before, but you will nevertheless enjoy, perhaps, the testimony of one whose efforts for nearly a score of years have been devoted to education in agriculture for one of the most notable of these prairie States. If you choose, the privilege of cross-examination shall be granted at the close; but I have added another witness in the reproduction of typical photographic views for your inspection. I may say, just here, that these views were collected from many sources, too late in the season to secure exactly what I might have chosen as in all respects typical.

In this address the phrase "Western prairies" is meant to cover the almost treeless slope directly east of the Rocky Mountains, and from 200 to 300 miles west of the Mississippi river. It crosses the United States from north to south, and is about 1,400 miles long and from 500 to 700 miles wide, divided almost in the middle by the 100th meridian of longitude. It covers the greater portion of ten States and two territories, practically about one-third the area of these United States, excluding Alaska. It has surface enough to make 120 States as large as New Jersey.

This slope rises gradually from southeast to northwest, varying in elevation from 500 to 5,000 feet, with slightly higher hills in places, and with many irregular valleys and gulleys washed by the western tributaries to the Mississippi. Upon the sides of the valleys "the bluffs," sandstone or limestone rocks crop out, giving in some localities the natural building material of the region, and showing the sources of the prevailing soils. The northern half shows still the marks of that great period of erosion called "the glacial epoch," and the western portions partake in surface soil of the elements found in that great granite wall we call "The Rockies."

Across this 500 mile slope flow the long rivers that have their origin in the mountain range, and, with their few tributaries of lower

origin, form the sloping basins of the western side and the deeper valleys of the eastern. In many places such streams seem to have no banks, but flow, in June, like the full meadow brook, across the limitless prairie. Elsewhere the bluffs rise by short terraces 200 feet, marking most precisely the boundary between the most fertile valley and the less fertile high prairie. The surface of this prairie varies from an almost perfect level, slightly dishing toward the streams, to a series of rolling lands, or hills, divided by water-washed gullies, or "draws," of precipitous sides and indefinite depth.

In all this region, trees of nature's planting are confined to the deeper valleys of the eastern portion or the larger draws of the rolling prairie. But for the planting of a few hundred thousand acres of forest, the larger half would be to-day absolutely treeless. In many portions still the annual prairie fire in early springtime, after the dry winter, sweeps clean of all verdure hill and plain. Only the deeper valleys escape by reason of moisture retained from the streams.

The soil of the valleys is similar to the virgin soils of wooded countries, rich in organic matter from successive growth and decay of a luxuriant vegetation. The hills and plains are dependent for their accumulation of "humus" upon the succession of grass crops fed down during summer and autumn and winter by huge herds of buffalo, and burned each spring by the Indians. Otherwise the soil of plain and hill seems nearly as friable and fertile as the valleys, and endures cropping as well.

Over all this region the climate is subject to more or less influence from the mountain wall that intercepts all moisture in the prevailing southwest winds, making an almost regular gradation in the annual rainfall from 35 inches on the eastern border to less than 15 inches on the western. Even the larger supply is rendered somewhat fitful from the necessity that most of it comes on the less regular winds that blow over and up the Mississippi valley from the Gulf of Mexico. For the same reason the absence of local cloud areas is noticeable, and sunshine reigns supreme. In the record of one year at our Kansas home, there were but eleven days without the cheer of noticeable sunshine. In most parts the wind record is large, both by the year and by the hour. In a considerable portion the grand cyclonic circles of windstorms have full sweep and make themselves disagreeably felt for three days together. Those coming after the dry winter months and before the April rains often bring heavy

loads of dust from the north for a day, and then after a lull of a few hours return their load with equal energy. I have seen a field, too early sown to oats, completely denuded of friable soil, including the seed. Deeds and mortgages give no exemption against such reprisals. Fall plowing is for this reason chiefly unpopular. If with such a wind there comes a moderate snowfall, as sometimes happens, snow and earth are mingled in strange confusion and tumbled into drifts that bear the complexion of soot. Extremes of heat and cold are also more noticeable than in similar latitudes further east, and follow each other in quick succession; yet so generally dry is the atmosphere that a cold below zero brings little suffering to one protected from the wind, and a heat of 110° in the shade brings no sunstroke.

Across the center of this broad area lies the region most subject to those whirling tornadoes, popularly known as "cyclones," though they are by no means confined to this region. That the common opinion of their frequency is exaggerated because of the extensive territory reported under the same name, will appear from the fact that in my eighteen years' residence in Kansas I never saw one, and with quite extensive travel over the region I only once saw the devastated track of the grim monster. A similarly exaggerated impression as to the prevalence of local hailstorms is rife. So general is this that when, in 1882, it was proposed to construct a small greenhouse for the Kansas State Agricultural College, an architect long resident in the State presented a plan without glass in the roof, believing it impracticable. The house was built with glass, however, and twice enlarged. It has stood full sixteen years with but one damaging hailstorm.

Altogether, the climate of the region gives health, vigor and exhilaration, rather than disease, lassitude or the blues; and the stimulating energy of its sunshine, with sufficient moisture, makes the vegetation of a season sometimes wonderful in rapidity of growth and extent. In describing the peculiarities of Western farming I may refer incidentally to peculiar phases of climate.

In this vast region of nearly 1,000,000 square miles there are not far from 4,000,000 people, scarcely more than are now crowded within the 300 square miles of the new city of New York. The distribution to the square mile over agricultural and grazing communities varies from thirty-three along the eastern border to less than one at

the western, and approaches the lower limit very soon after passing the middle line of the 100th meridian of longitude. Of cities within these limits there are none of more than 50,000 population. Nearly 60 per cent. of the people live by farming directly, and most of the rest are indirectly dependent upon the profits of farm labor. The indirect dependence of great outside enterprises, like the packing-houses of Kansas City and Chicago, or the six great trunk lines of railway that cross these plains, nobody can compute.

A few comparisons may serve to show the importance of this once American desert in the agriculture of the country. From the statistics of the Department of Agriculture in 1896, I estimate that these prairies, thinly populated as they are, produce two-fifths of the wheat, one-fifth of the corn and oats, and one-half of the barley raised in the whole country. They also sustain one-fourth of the horses and mules, one-fifth of the cows and two-fifths of other cattle, one-third of the sheep and one-sixth of the hogs. Yet it is less than fifty years since travelers crossing these plains took their life in their hands, and insurance companies required extra premiums from such beneficiaries.

With this basis for mutual understanding, I propose to illustrate the peculiarities of prairie farming by views and reminiscences, chiefly of Kansas, with which I am most familiar, and where a longer settlement and a larger population have made the methods and results more definite. It may be proper to note that, while Kansas, by reason of its intimate relation with the East through extensive financial as well as other relations, has gained an unenviable notoriety for short crops through grasshoppers, droughts and even floods, her average crop of corn per acre in twenty years is more than 17 per cent. greater than that of the United States, and the average of ten years' crops of corn, wheat and oats, in spite of careless and wasteful experiments, is but a trifle lower than that of the old agricultural State of Ohio. The bad name of recent years came chiefly from a hurried settlement and unsettlement of the western third of the State for purposes of tillage.

Let me first present, as I am able, the various phases of development of prairie farms from the bare range to the well-tilled and tree-protected fields of growing crops, in which lands pass in value from the government price of $2.50 to $40 or $50 per acre, and trace the farm-house from a tent, through a sod-house or rude stone hut and

two-roomed cottage, to the family home of taste and comfort, while the dug-out stable gradually gives place to comfortable barns and cribs, with windmill and silo. Then I can explain in succession the characteristic interests of livestock and field crops with such particulars as time will allow.

A typical farm is seldom less than a quarter section of 160 acres (and is oftener twice or four times that), surveyed in a rectangle with a road on at least two sides of it. Usually it lies fairly level, with every acre plowland. Occcasionally a rough pasture or meadow is left on the banks of a stream, but too often every available spot is cropped, the unoccupied land or range affording free pasture and a limited crop of hay for wintering the team and the cow. Only after years of experience does the average farmer find his way to permanent pastures or to meadows of so-called tame grasses.

But antecedent to more definite tillage has always been the cattle-feeding of the range, an industry that still has sway over almost the entire western half of the prairie region, notably in Montana, Wyoming and New Mexico. Upon these ranges the cattle were once practically wild, being handled in large herds, under oversight of the energetic cowboy, whose broncho, lariat and revolver were always more or less in evidence. An occasional roundup for branding the calves, and an annual drive of the mature steers for hundreds of miles to a shipping station were of chief importance. In winter the cows and young stock roamed wherever bunch grass or buffalo grass, cured in its place by the dry autumn, afforded a bite to keep body and breath together. Often a severe blizzard or a heavy snowstorm decimated the herd, and sometimes an extra cold winter brought starvation and desolation before spring. I have myself seen miles of prairie strewn with the dried up carcasses of a ruined herd. Of late years, however, a larger capital and more thrifty methods have fenced ranges, graded up the stock with shorthorn and Hereford blood, and provided by crops of forage and alfalfa hay for humane and profitable wintering. Cattle are shipped with comparatively little driving, and in great numbers stop at various points for fall and winter feeding upon the huge cornfields further east. This business has developed the strong interest of the West in the beef-steer, which now travels either alive or in quarters over all the country, and even across the Atlantic. Along with this interest has come investment in the very best of the beef-breeds, and now the dairy cow is claiming place in the herd, Kansas

having won the prize among all competitors for butter exported to England.

Beef-feeding is extensively practiced by the best farmers as insuring a fair price for corn, if carefully handled. Risks from unfortunate marketing and from the terrible Texas fever are always to be met by shrewd buying and selling, and a vigilant quarantine against southern cattle. Other diseases of cattle are of slight account, pleuro-pneumonia being unknown, and tuberculosis seldom found. In former days the introduction of a strange herd always brought anxiety, and now occasionally brings death to pasture and feed-lot. Texas fever has long been known to attack only northern cattle brought in contact with southern ones, or driven over fields or roads where southern cattle had passed before winter frosts. It is now proved that the cattle ticks found in large uumbers on southern cattle are the sole cause of transmitting a disease from which the Texas steers are themselves exempt.

The usual feed-lot is a partially-sheltered space near a stream. Here the steers, after being dehorned for safety against goring, are fed in close groups with as many or more hogs following, upon snapped corn, husked corn, chopped corn and shelled corn, with stalks, sorghum or prairie hay for "roughness." When the addition of further flesh costs more per pound than it brings, steers and hogs are shipped to the stockyards of Kansas City, Omaha or Chicago for sale. Kansas alone sends to slaughter annually nearly $40,000,000 worth of animals.

Of other live stock, horses and mules have been staple till the recent changes in city transportation have reduced the price below the cost of raising. The original broncho is still in evidence, but most excellent draft horses and roadsters are now raised over all the region. Kansas owns nearly a million of them altogether, held at $25 each. They are practically the only farm teams.

Hogs are the mainstay of farmers for consumption of their corn crop. Their quality is universally good, the Poland China and the Berkshire blood taking the lead. At the Kansas City stockyards any other than black, or nearly black, hogs are almost never seen. Kansas claims nearly two million hogs, worth nearly five dollars a head.

The sheep of the plains are chiefly in large flocks, on ranches levoted to sheep-raising for wool. Montana, Texas, New Mexico,

Wyoming and Colorado lead in order. Of the use of sheep in mixed farming, little is known anywhere, though great numbers of the range sheep are fed in fall and winter on the more eastern farms. Kansas reports each spring nearly as many dogs as sheep within her borders. The mutton breeds have yet to find their place in the general farm economy of the West.

Of poultry there is no lack, though only the natural conditions of sunshine and free range and abundance of insects for food have fostered it. The Kansas hen has often saved the pioneer from suffering, and at this day the income from poultry is greater than that from any single farm crop except wheat, corn and Kaffir corn.

The peculiarities of cropping can best be told by reference to the several crops. As yet the question of preserving fertility by rotation of crops is little thought of, and even a study of distribution of labor through the year is seldom made. The multitude look for that crop which promises the largest immediate return for labor expended. The natural adjustment of interests on the farm, so frequent in older communities, awaits the meeting of pressing wants in building the home or paying the mortgage that has built it.

In the entire region taken together, wheat is chief of crops because it is best adapted to pioneer conditions generally, is most easily adjusted to conditions of climate, and usually best bears the expense of transportation to market. But in the older portions of prairie land, it yields to other crops, involving more of the farmer's industry and skill. In the northern half the crop is chiefly a spring one, the seeding being made in early spring and the harvest coming in July and August. The varieties are chosen accordingly. South of Nebraska the crop is sown in September and October, and harvested in June following. Kansas this year furnishes nearly fifty million bushels of wheat, of which only about one million bushels are of spring sowing. Both the spring and the winter varieties are so called "hard" wheats, usually bearded and strong growers. The grain berry seems undersized and dark to an Eastern grower. The rankness of growth varies with the season. I have seen wheat cut by a "header" hugging the ground to gather the heads, and I have stood in wheatfields over which I could barely see. I have seen wheat plowed under in spring after a dry and freezing winter, and seen the same field with 50 bushels to the acre. The methods of culture, harvesting and handling are shown by the illustrations. Drilling is universal, an-

usually upon plowed land. Harvesting is by the most approved machinery. For views of the great wheat industry, as bonanza farming of the Northwest, I am indebted to an article by Mr. William Seler White in the November issue of "Scribner's Magazine." I here gratefully acknowledge my obligations to Messrs. Charles Scribner's Sons for the privilege of using these illustrations, and refer now to the article named for a most interesting description of the great enterprise. The dry atmosphere of summer and autumn fosters the careless storage of grain.

Over a large area, with an altitude below three thousand feet, "corn is king." Kansas plants about 8,000,000 acres yearly, and Nebraska nearly three-fourths as many. A visitor to these prairies in June and early July appreciates the "walls of corn," of which a Western poet sings, and from almost any hilltop he may see literally miles of the matchless green. The chief varieties are the strong-growing dents, and in favorable seasons the growth is enormous. The stalks stand sixteen feet in height, with ears barely within reach. I have myself walked through a cornfield in July where every ear was above the range of my hat. The yield is often seventy-five bushels per acre, but averages in thirty-five years less than twenty-eight bushels. The average in Ohio is nearly thirty bushels.

The culture of corn in that region is peculiar enough to require description. Fully four-fifths of the crop is raised by a method called "listing." The combined lister is a large double-shovel plow, with a small subsoiler just beneath the shovel and an ordinary drill behind it. The shovel is run by two or three horses about four inches deep, and the corn is thus drilled in the loosened bottom of furrows about three and a half feet apart, the intervening space being covered by the loose earth thrown on each side of the shovel. The corn is harrowed, then cultivated carefully with a shield in the furrow, then without a shield, when the corn stands in a level field, firmly and deeply rooted. It thus endures dry weather better, but suffers in a wet spring The universal opinion is that to raise corn by listing costs from fifty to seventy cents less per acre than by other methods, and that the average yield is from ten to fifteen per cent. greater. The average cost of a bushel of corn by listing is fourteen cents, while by planting in check rows the cost is nearly sixteen cents. The special advantage comes in the speed of planting. A single team can put in six or seven acres a day, just when the ground is in best condition.

Yet the best farmers plow their land about every third year, even if they use the lister in planting after plowing.

In harvesting corn the majority husk from standing stalks, feed down the stalks by cattle, chop and burn the remains in the spring and plant again as before. The most thrifty farmers carefully cut and save the corn fodder, or put up corn and all in the silo. A horse cutter is shown in the illustration.

Corn-raising and cattle-feeding are frequently combined to great profit. A single farmer of my acquaintance raises from 1,200 to 1,500 acres of corn annually and never sells a bushel till manufactured into beef and pork. The Kansas farmer burns corn only because he has corn to burn.

Of oats and barley, I need say nothing, as methods there and here are essentially alike, except for the larger scale. But over a large area the raising of various sorghum plants for forage is extensive. Much of this is the outgrowth of planting the saccharine sorghums for sugar. The immense growth of the cane suggests feeding. I have seen stalks nineteen feet high. Later, the non-saccharine sorghums are taking the place, because of the greater product of seed. Doasha, Milo-maise, Jerusalem corn and Kaffir corn are all sorghums. Of all these, the last-named gives the best returns. It yields of its hard, starchy seed fully as many bushels as corn, and it furnishes even in a dry year a most nutritious fodder, the leaves remaining green till autumn. It is planted and harvested like corn, except that the heads must be cut off and threshed and the seed must be ground before feeding.

Of the hay crop I need say little. The wild prairie makes the most of it, tame grasses being confined, except under irrigation, to the eastern hundred miles or so of the region. These at present stand in this order: timothy, blue grass, alfalfa clover and orchard grass, though alfalfa or lucern is rapidly moving to the front as being better adapted to the dryer regions, and more permanent when established, as well as a great yielder. Three or even four cuttings a season may give two tons per acre at each. Though the plant is somewhat woody, if well handled it makes good hay, which cattle soon cultivate a taste for, and as hog pasture it is not surpassed.

Root crops are not extensively cultivated, but potatoes of early varieties are staple throughout the region. The potato king lives in eastern Kansas. A single firm plants 500 acres and uses 5,000

bushels of seed potatoes, but the seed is imported from Minnesota, and many of the late potatoes for winter use are also brought from northern climates. Hot, dry summers make a short crop of late potatoes.

Of the fruits, apples, peaches, grapes and cherries are most productive. The man who has planted the largest commercial apple orchards in the world is Judge Welhouse, of Topeka, Kansas, whose orchards gave in a single year $40,000 of profits. These apples are of four varieties—Ben Davis, Missouri Pippin, Jonathan and Winesap.

Of vineyards Kansas has 7,000 acres, mostly of the Concord vines, but Kansas took the medal at Chicago for a display of varieties.

With irrigation every kind of fruit reaches perfection. Of irrigation farming it is fit that I give some illustrations. Wherever water is available from streams an excellent use has been made of irrigation for all crops. Nebraska and Kansas have both made larger efforts in this direction. But now the chief interest attaches to the small reservoir supplied from wells with windmill and pump, watering from five to ten acres, to secure the home, while the dryer prairie is tilled and grazed for profit or loss. The illustrations suggest the multiplication of these small centers of thrift over much of the semi-arid region.

Special crops are found in special localities, as cotton in Texas and Oklohoma, flax, castor beans and broom-corn in Kansas, and melons in Colorado or Kansas. Seed farms in western Kansas have had repute because of their safe isolation from crossing varieties. The sugar beet industry has had a special development in Nebraska.

By kindness of Dr. Wiley, of the United States Department of Agriculture, I am able to show illustrations of this new industry. Farmers are said to have received five dollars a ton for an average yield of ten tons per acre. The necessity of large capital in the works compels the utmost care to secure knowledge of the exact character of beets raised in any locality, as well as to have long contracts for raising them, and ready means of transporting them from the fields. Good beets are raised entirely under ground, in a soil well tilled to a depth of eighteen inches, and absolutely clean. They should grow slowly to a weight of one pound or less, and mature in a warm sunshine. A summer temperature above 70° on the average gives poor results in sugar content, which ought to be from 15 to 20 per cent.

To show the general thrift of the community of Western farmers, I give a few illustrations of the Kansas State Agricultural College, located at Manhattan, where the State has expended for buildings and apparatus over $400,000, and where seventy per cent. of the 730 students are sons and daughters of farmers. A live Secretary, with the State Board of Agriculture and a system of institutes maintained by the college for sixteen years, have fostered a truer agriculture.

In conclusion, I desire to have you, in imagination, picture the pioneer farmer himself in his struggle with the wilderness. A young couple from Ohio or New Jersey have migrated in early spring to a prairie farm, whose 160 acres is as clear of obstructions as a floor. There the sod house shelters them. With the aid of a neighbor's team added to his own, he breaks a cornfield by turning a sod three inches thick as flat as a sixteen-inch furrow will lie. His corn is dropped in the furrow. It grows; oh, how it does grow! But the grasshoppers come, and he kills them, it seems, by tons, crushing them between rollers or catching them in kerosene. Under his vigilant culture the stalks mount upward, till, on the 10th of July, he promises himself a crop that will pay for his home. The drought sets in, hot winds sweep over his fields for days, till the corn stands white-topped and withered, and the chinch bugs suck the juices that remain. He hurries to put in his wheatfield. It, too, grows with a promise of sixty-fold. But a dry, freezing winter thins the stand, and a dry spring fosters the chinch bug, till in May he despairs of any crop, and lists the field for corn. By this time the limit of his credit for more than cow and hens can pay for is reached, and he must plant a mortgage. The neighboring town, settled in the "boom" of which he was a part, has three or four banks and a dozen brokers, ready, for a commission, to furnish all the money his land can carry, at the moderate (?) rate of twelve per cent. So he gambles again for a crop. If successful, as he may be, he enlarges his venture, builds a new house to protect his increasing family, and keeps up the mortgage for stock and machinery. Soon he learns that ventures of several kinds are safer than one, and his struggle for a living becomes a struggle for wealth. The large prizes in occasional crops are stimulating. It has frequently happened that a single crop of wheat has paid for the farm it grew upon. But such ventures are hazardous before insects, and droughts, and storms, and diseases; and the unsuccessful years hang over the energies at all

times. In spite of all these obstacles, the farmers of the West have made the Great American Desert a place of enterprise, and have established the great industries and the thrifty homes illustrated before you this evening. The group of burros loaded with faggots may stand for the farming which came from Mexico, and will yet give way entirely before the enterprise of American pioneers.

A vote of thanks was given Dr. Fairchild for his excellent address.

SUITABLE MANURES FOR FRUITS.

BY PROF. H. E. VAN DEMAN, LATE U. S. POMOLOGIST.

SUITABLE MANURES FOR FRUITS.

Mr. President and Gentlemen—When your Secretary asked me to come before you I asked him what he wanted, and he suggested certain things, but gave me a very wide scope. I thought of talking to you about manures for fruits, but if there are other things suggested in my talk, connected with the matter in hand, I shall be happy to have them brought up by you, and if I may be able to help you I shall be glad to do so.

It may be well to say at the outset, that I am not an agricultural or analytical chemist, nor do I make any pretensions to being skilled in the intricacies of the science of soil physics. It is from the point of the fruit-grower who is seeking for better ways of getting at an understanding of his business, that I would wish to present some thoughts upon the subject of suitable manures for fruits. They are by no means new to most people, and especially to you who are foremost in your calling, that is, the tilling of the soil and all connected therewith. But I may be able to emphasize some of the simplest principles or the leading points, which it is certain we cannot understand too well.

Perhaps there is very little difference of opinion among all those who work the soil for a living as to the general need of enriching it for the profitable production of crops. While the ordinary farmer very plainly sees the absolute necessity each year and the almost immediate response of his crops to the application of suitable manures, the fruit-grower is none the less in need of such kinds as are suitable to the wants of his trees, vines and plants.

The agricultural chemist and the practical everyday farmer and fruit-grower have both separately and jointly studied, experimented and worked out the problem of the composition of various soils, and when, what and how to apply manures and fertilizers to the best advantage, until they are fairly well understood by the most advanced in each of their respective lines.

But there is yet room for a more general knowledge of the entire subject. Everyone who deals with that most mysterious substance, the soil, is often at his wits' end to know what is best to do with it, because it is of all possible shades of variation, as to its constituent parts, mechanical conditions, climatic affections and the contour of its surface.

He has tried this and that, sometimes succeeding, and perhaps oftener failing of the results he had hoped to attain. Allowing for all the innumerable variations of climate, rainfall and other contingencies, there are certain quite well-defined principles to be observed and relied upon, and lines of action that are usually safe to follow.

Let us look at this time into those things which pertain more especially to the fruit-grower.

Of what are his fruits composed? Which are the manurial elements that best serve his purposes?

How, when, and in what forms should he apply them?

According to those who have analyzed the various kinds of fruits, they contain the following proportions of water and the several manurial elements:

	Partial Analyses of Fresh Fruits.			
	Water.	Nitrogen.	Phos. Acid.	Potash.
Apples	85.30	.13	.01	.19
Pears	83.92	.09	.03	.08
Peaches	87.85	....	.05	.24
Prunes	77.38	.16	.07	.31
Cherries	86.10	.18	.06	.20
Grapes	83.00	.16	.09	.27
Blackberries	88.91	.15	.09	.20
Raspberries	81.82	.15	.48	.35
Strawberries	90.84	.15	.11	.30
Oranges (Florida)	87.71	.12	.08	.48
Chestnuts (native)	40.00	1.18	.39	.63

It is therefore to be noted from the above table that they are composed of water in a very large degree, with certain amounts of the three chief elements of all manures, which are nitrogen, phosphoric acid and potash. Not only do the fruits contain these three important things, but the leaves, wood and roots of the trees and plants bearing them contain more or less of them. Moreover, they act in a most positive and invigorating manner upon the entire system of all growing vegetation, although in different degrees and in accordance with their different requirements. They are absolutely indispensable to the growth of vegetation.

There are other elements and chemical compounds which are essential to plant life and development, and in most soils they are found in available forms and in sufficient quantities for ordinary crops. The application of lime is often attended with good results, especially if there is an excess of decaying vegetable matter in the soil. Most of our tillable soils have a large natural content of phosphoric acid and potash, and in many cases seemingly inexhaustible, but largely in such forms as to be available only under the most judicious treatment, after that part has been consumed by repeated cropping which nature made available in what we call her virgin soils. Nitrogen being the most transitory and easiest appropriated, is soonest exhausted in nearly all cases; but fortunately there are means ready at hand of drawing upon the inexhaustible supply in the air. But to know what are the special requirements of the several fruit crops and how to best meet them, is one of the problems that every fruit-grower should seek with all his diligence to understand as fully as is possible.

NITROGEN AND ITS EFFECTS ON FRUITS.

It has been fully demonstrated, over and over again, that nitrogen has a remarkably invigorating effect on vegetation, especially in causing a leafy, succulent growth. It is just what the farmer needs, in large supply, who grows hay and other forage crops. But the fruit-grower should use great caution in the application of nitrogenous manures. If unleached, they are apt to contain a considerable proportion of nitrogen, and may cause too rank a growth of wood, vine or leaf. Especially is this true as regards the grape and strawberry. Nitrogen also prolongs the period of vegetation. It makes fruits later in ripening than they would have been if a less amount of it had been available in the soil. Consequently they lack color in most cases. This is especially true of winter apples.

An oversupply of nitrogen also makes fruits softer and poorer in quality than if a normal amount were present. It is possible, and not a very uncommon case, to have strawberries seriously damaged by its injudicious use. The berries become so soft as to bruise at the least handling, and although large and showy in the field are wilted and poor-looking in the market. A normally-firm variety of strawberry may be made soft by too much nitrogen, and perhaps unjustly con-

demned. The same is true of other kinds of berries, peaches and other fruits, and in variable degrees. But it must not be thought that nitrogen is not needed on the fruit farm, for it certainly is of great benefit when used in proper proportion to other manurial elements. When a bearing fruit tree is not making an average of a foot of growth each year on its terminal branches, and the leaves do not look dark and healthy, it is probable that there is a lack of nitrogen in the soil. There are various sources of nitrogen for the fruit-grower's use, the cheapest of which, in most cases, is perhaps the air. All the leguminous crops have the peculiar ability of gathering or taking in nitrogen through their leaves and storing it in their structures in organic form. Crimson clover and cow-peas are about the best of all of them for the fruit-grower's use. They may be grown even in bearing orchards with very little obstruction to the cultivation, that should, as a common practice, begin in early spring and be continued at least until the growth is well begun. In June, cow-peas may be sown broadcast, drilled or dropped in hills, a bushel per acre, and, if either of the last two methods is used, cultivated until they are too large for further working. An early kind, such as the common black one, if planted by the middle of June, will mature or come nearer to that stage before frost as far north as southern New York. Crimson clover, as is now quite generally known, may be sown more than a month later, and will cover the ground with a carpet of green all winter and mature early the next season, or it may be plowed under at any time in the spring. The velvet bean is a more lately-introduced nitrogen collector that is proving of the most useful character, and behaves much like the cow-pea.

All these and other similar crops are of the highest value to the fruit-grower if plowed under or worked into the soil by disc harrows. Over one-half of their manurial value is in their roots, and therefore already in the ground, but the additional manurial value of the tops is not their only benefit, for they make humus, which is an important factor in all cultivated soils. Nitrogen may also be added to the soil by means of various organic substances, such as dried blood, tankage, dried fish and cotton-seed meal; also in inorganic forms, such as sulphate of ammonia, nitrate of soda, &c. They are soluble in water and become effective upon plant-growth within a very short time if applied in the growing-season.

PHOSPHORIC ACID.

Phosphorus is a mineral which becomes in the plant a subtle and constant accompaniment of life, and is found chiefly in the most highly-organized forms. United with hydrogen and oxygen it forms phosphoric acid, in which form it enters plants and causes them to grow luxuriantly, and assures healthful and robust proportions. It exists in the protoplasm of the organic cell. Seeds contain it in some degree and the nerves and bones of animals more largely. It is indestructible by fire and is always found in the ashes of plants. In fact, this is one of its most available forms for the building up or invigoration of succeeding plants. Fruits contain it especially in their seeds, and it is necessary for the fruit-grower to know how to make available the hidden stores of nature in the soil and to be able to add to them when necessary and in cheap form that which is needed. Tillage may be said to be one of the most potent factors in this work. It conserves the moisture of the soil, which is one of the agents in the dissolution of certain forms of phosphates, especially the superphosphates, which consist chiefly of soluble forms of phosphoric acid. A hard and compact soil cannot contain nearly so much water as one which is loose and porous, just as a flint rock will absorb less water than a brick, or a ball of clay more than a brick, or a sponge more than all of them. The finer the soil is pulverized and the more humus there is in it to give it porosity without making it too loose, the more moisture it will hold. Then we must keep the top thoroughly and frequently stirred to prevent the escape of the water into the air, except through the leaves of the growing crops. But the soil must not be wet; it must not be water-soaked. That would shut out the air, and that is just as necessary as the moisture. Hence we must have our fruit soils, as well as all others, underdrained either naturally or artificially. The most of them, with proper plowing and sometimes subsoiling, and with thorough surface treatment, are quite good enough without underdraining.

But there will come a time with every soil when additional supplies of phosphoric acid will be very helpful and profitable. The chief sources of phosphoric acid are animal bone and phosphate rock, the latter being only the fossilized bones of prehistoric animals or their residue, mixed with extraneous mineral matter. The finer either of these substances is ground the better—that is, the sooner

and more readily their manurial value may be felt by the trees or plants to which they are applied. Mechanical pulverizing, if supplemented by treatment with sulphuric acid or by steaming or boiling, in case of raw bone, will add to their availability. Bone-black and bone-ash are less valuable preparations of bone, because they are less available and minus the nitrogen which was driven off by the heat used in their preparation. Thomas or basic slag, which is a residue from the smelting of certain iron ores, is becoming quite popular.

POTASH.

The backbone of all fruit manures has been truly said to be *potash.* It gives color and solidity and good flavor to all kinds of fruits; at least, these characters are found to invariably follow the use or presence of potash in the soil. Its action upon all parts of the tree, plant or vine is highly beneficial. It seems to give the whole structure an appearance of vigor, productiveness, stability and beauty. We may not know just *how* it acts upon the plant, tree or fruit to make it vigorous, beautiful or well-flavored, but that it does it we do certainly know. It is like meat to the hungry day-laborer, like bread to the nursing mother or like pure air and freedom to the humming-bird. Strength, productiveness and beauty seem to follow its application to the soil.

There are in many soils, deposited by nature, quantities sufficient to last for many successive crops, but the available amounts will become exhausted in time, and then we must resort to means of replenishing. Cultivation and deep-rooted plants, like red clover, will by degrees make available or unlock the stores of nature by dissolving and bringing from the subsoil that which was otherwise unavailable. Water does its part of the work too. In a dry soil or a droughty season it is impossible for the potash, or, for that matter, for any other manurial elements, to become soluble and in condition to be absorbed by the rootlets. They are as powerless to avail themselves of the food within their reach as a horse would be to eat the food in his box when he was muzzled.

As to the sources of potash, aside from that which may be had in wood-ashes and in stable and farm manuress, they are all found in the several forms of German potash salts. They are all soluble in water and quite available. What is known as muriate of potash

is perhaps the cheapest form in which to buy potash. As it contains about fifty per cent. of actual potash, and is therefore much more concentrated and less bulky and weighty to handle, there is a decided saving. Sulphate of potash is another form of about the same content of potash and has a better effect on some crops than muriate, but for fruits the muriate is very suitable. Kainit is a much less concentrated form, being one of the crude products of the German mines. It has only from twelve to fourteen per cent. of potash, the rest being chiefly common salt.

CONCENTRATED *vs.* BULKY MANURES.

The matter of bulky manures is one which the fruit-grower, as well as the vegetable gardener and ordinary farmer, should consider well before buying, or carting long distances, even without other cost. There is very much of the coarse manure that is merely trash and water, with but a slight content of the essentials, nitrogen, phosphoric acid and potash. The straw and other bulky material will be valuable in forming humus, as it decays in the soil, but these questions come to the thinking man: Can I not produce the humus on the farm cheaper than to get it elsewhere? Could I not get the same amount of manurial constituents contained in coarse manures much cheaper in the form of concentrated commercial fertilizers? In many cases these questions have been emphatically answered in the affirmative by actual tests on the farm. In other cases they have been differently answered, particularly by vegetable gardeners. As has already been stated, the fruit-grower may grow leguminous crops in his orchards, and, to some extent, in his vineyards and berry patches also; thus, not only gaining a large amount of nitrogen at very little cost, but adding the needed humus to the soil. There is really danger of adding too much nitrogen to orchards by the continual growing of leguminous crops, and care should be exercised in this wise.

POTENCY OF POLLEN.

There is one question that we perhaps have not duly considered in connection with the fertility of the soils of our orchards and other fruit plantations or the lack of it, and that is, the potency or non-

potency of their pollen. This subject was treated at length and in a most thorough and suggestive manner by Dr. R. C. Kedzie, of Michigan, at the last meeting of the American Pomological Society. There is little doubt that sometimes our trees fail to bear fruit that is perfectly pollinated from the fact that the trees or plants are in such a low state of vitality that it is impossible for them to produce potent pollen. We always aim to have our breeding animals in the very best possible state of vigor, and why should we not treat our fruit trees and plants in the same way? The source of their profit to us lies mainly in their ability to be reproductive. Therefore we should feed them with the best food and plenty of it, if we expect them to set and hold their fruit.

As to the quantities of the different manures or ingredients of suitable compositions to apply to fruit-lands, that will greatly depend on what there is already in them in available forms, and what are their structural and physical conditions, and also somewhat upon the kinds of fruits to be grown. In any case the soil should be made rich in potash. Phosphoric acid should also abound in fair proportions, and nitrogen should not be neglected. But care must be taken not to get too much of it. Whatever the chemist or the theorist may say or advise, the soil and the crop must be the final test as to what and how much is best. But it is quite safe to say that, in ordinary soils, and with almost any species or variety of fruit, where nitrogenous crops or stable manures have not been largely used, there will be favorable results from the annual application of the following mixture:

Muriate of Potash	200 pounds.
Dissolved Bone	200 "
Nitrate of Soda	100 "

This may be varied by leaving out the nitrate of soda if nitrogen is applied in the coarse manures. Or superphospate from phosphate rock may be used instead of dissolved bone.

Whatever is done or not done, it is unreasonable to expect profitable crops of luscious and highly colored fruit from orchards, vineyards or berry patches that are not intelligently and abundantly fertilized.

Professor Halsted—The question of selling water does not seem to be objected to by the consumer of fruit as much as by the consumer of milk?

Professor Van Deman—The more water he can sell to his consumers the better they seem to like it. Stuff the skins of the fruit as full of water as possible and you are not robbing your farms of their fertility. The grain-grower, when he sells the grain off his farm, is skimming it, and selling the cream, while the fruit-grower is keeping his cream and selling his skim milk. He gets more, pound for pound, for his skim milk than the grain-seller gets for his cream, pound for pound. I give you this as something for you to think about. We talk about our nation selling so much corn, and we are apt to be proud of it, but we should export something that does not rob our farms of their fertility—we should sell what is represented by skilled labor rather than by fertility.

Mr. Lewis—What will we do with our wheat?

Professor Van Deman—I can't say. Wheat will be sold as long as the world stands, and I am glad of it. But when we are selling wheat we are not selling the water from our farms; we are selling their fertility, for there is only about 10 per cent. of water in wheat, as you know.

Mr. J. S. Collins—It would be all right to sell the flour and keep the bran at home.

Professor Van Deman—That would be the scheme if it could be carried out. Keep the fertility at home. A farm should be getting better and better, under a judicious system of farming, instead of poorer and poorer. We have millions of acres of land where there is nothing left but the skim milk. If we could only stop this and sell more water from our farms, we would soon see an improvement in their fertility.

Professor Halsted—How about the water in a Spitzenbergen apple, as compared with that in the Ben Davis?

Professor Van Deman—I cannot say. There is quite a difference in the varieties of fruits. Take grapes, for instance, as we grow them and as compared with those grown in California. They contain considerably less water, for when we dry our grapes there is nothing left but the skins, the water in them being in larger proportion, but when the California grapes are dried they are fuller and contain much more meat.

The Chair—If we could make use of the nitrogen in the air it would be a great thing for farmers?

Professor Van Deman—Yes, sir. It is estimated that the nitrogen in the air over one acre of ground is worth $10,000.

The Chair—Can't you fix that so we can sell it? [Laughter.]

Professor Van Deman—You are already doing that on a small scale when you sell fruits.

Mr. Baker—In reference to this question of strawberries being too soft, might not the application of nitrate of soda have something to do with this in the time of application?

Professor Van Deman—Yes, sir, without doubt.

Mr. Baker—I think this is caused by too late an application of the nitrate of soda. It should be applied in the spring as soon as the plant shows an inclination of growth. If delayed until the bloom starts you produce the effect of soft fruit.

Professor Van Deman—Mr. Baker is entirely correct in this.

Mr. Lewis—Cannot something be used which will act more slowly?

Professor Van Deman—That would not help you eventually, I think. I think it would be best in your orchards, for instance, to use stable manure all over the ground and let it be taken up gradually by the decay of the manure. Nitrate of soda might be applied to peach orchards in the spring, but if this is done you will note a difference in the condition of the crops, and the results will be very different from an application of stable manure the year before.

Mr. Baker—I was afraid that other forms of nitrogen might produce an effect when I did not want it. If I used ammoniacal manures of other forms I had to depend on the rainfall, but if I used nitrate of soda I got the effect when I wanted it.

Professor Van Deman—Nitrate of soda will take effect in three or four days, and you will note a difference of color in two days. With the other manures they depend largely on the rainfall before they can become of use to the plants, as they consist largely of water.

Governor Hoard—They drink rather than eat?

Professor Van Deman—Yes, sir; they drink their food.

This question of manuring has much to do with the condition of your apple crop. When heavily manured with stable manure they will be later in maturing, and they will run along into the fall season. They may even run so late they will not have time to color up properly. Heavy manuring will also prolong the season for the cantaloupe, making it later than where but little manure is applied.

Mr. Baker—I tried nitrate of soda on young seedlings in the hot-house, and I found it made them thrifty, and started them right off, and they were soon fit for transplanting.

Professor Van Deman—The fruit-grower finds that the first few days of the market is the cream of it, and the prolongation of the ripening of the crop has all to do with the profit or loss on that crop.

Mr. Decamp—That is what we are troubled with; our winter fruits ripen too early, and fall off before it is time to store them. We have not been manuring them heavily with stable manure.

Professor Van Deman—What apples do you grow?

Mr. Decamp—We are growing the Baldwin for late storage.

Professor Van Deman—Heavy stable manuring will make the Baldwin later.

Mr. Decamp—That is what we want.

Professor Van Deman—It will undoubtedly make them later, but it will also cause a lack of color.

Mr. Roberts—I think if that doctrine is followed it might make it later, but the Baldwin apple falls because of a fungous growth. I would spray with the Bordeaux mixture about the 1st of August, and then they will stick on the trees.

Professor Van Deman—I would not plant a Baldwin in the State of New Jersey.

Mr. Roberts—I would.

Professor Van Deman—It is a little south of the Baldwin line. New York and Massachusetts are about right for Baldwins. In the northern part of New Jersey, in the hilly regions, the Baldwin will do much better than in the southern part of the State. They do well in New York, but I should think the Baldwin would not be a late keeper in New Jersey.

A Member—It is not a success in the northern part of the State.

Mr. Roberts—It is not a success anywhere in New Jersey, nor even in New York, nor anywhere else, unless taken care of, but if you treat the Baldwin with common-sense decency it will treat you first-rate, and it is a fine fall apple. That has been my experience with the Baldwin.

Mr. Fish—They are the best apple to raise, and I raise several kinds. I can keep them until the 1st of April. They will keep longer than the Smith Cider apple, and I keep the Smith Cider until February.

Professor Van Deman—The whole sum and substance of the matter is this—raise what pays you best. [Applause.] This rule is the very best guide the farmer can have. If you have found a variety, whether Baldwin, Northern Spy, Smith Cider, or whatever the variety may be—if you have found one what pays you, that is the one to grow. I will not contend for any one variety, as that is not the object of my talk to you to-day. The question of variety is largely a local one, and all we can do is to lay down general principles.

Governor Hoard—It is with apples as with animals, the man does best with those he likes best.

Professor Van Deman—That has something to do with it, although certain varieties are restricted to certain localities or latitudes.

I would like to ask you right here how the cow-pea has done in New Jersey. You know this has come to us from the South, where it has been raised for years, and where it has done amazingly in some of their poor, sandy soils.

Mr. Baker—The cow-pea in our county has not been a success. We sowed them with oats, but the oats choked them out. We use the Canada variety, and sow them with oats, and the two are cut together for ensilage and are a success. The Southern cow-pea does not have the proper growth, and the oats smother them out.

Professor Van Deman—The growth of the oats is too strong.

Mr. Black—It has not done well in Cape May county.

Professor Van Deman—It is foolish to sow them with oats.

Mr. Baker—I am simply telling you what has been the experience of others; I did not try it.

Mr. Budd—I tried sowing them with rye and found great difficulty in plowing them under.

Governor Hoard—This is really a bean—a running bean.

Professor Van Deman—The cow-pea is as tender as a bean. The soil should be thoroughly warm—about as warm as when late corn is planted. It should never be sowed with oats.

Professor Voorhees—We have had some experience with it at the Station. It has been raised successfully as far north as Morris county. It is grown for forage purposes successfully. In some parts of the State it is grown for green manure. I have seen nine tons per acre of cow-peas from good soil. We find further north that the black-eyed variety does better. Further south the cow-pea does best. We can depend upon it always. We mow it and cart it into the

barn same as other soiling crops, but I have never tried it in the silo. Nitrogenous plants will not do as well for the silo as more carbonaceous plants.

Professor Van Deman—They say it gives a bad flavor to the milk.

Professor Voorhees—I think that is not the fact. We have used it with great success as a forage and the animals like it very well, and they do as well as on any other nitrogenous food.

Governor Hoard—If the cow is fed rank clover it will have the same effect in flavoring her milk.

Professor Voorhees—We feed 30 pounds to a mess, and we have never found any flavor in the milk. We feed two messes of them a day, or 60 pounds daily, without any trouble. We grow oats and peas also, and the oats and the Canada pea can be sown very early. We get most excellent results from them, too. The cow-peas can be sown from the latter part of May to the first of July, and two months after sowing they are ready to cut. If you allow them to grow too long they get too hard; they should be cut as soon as the pods are entirely formed. The black cow-pea gives the best returns, we find. We have grown these peas for green manure in Monmouth and in Burlington county, and with the application of potash and phosphoric acid had a good return. These soils were devoid of vegetable matter, and so sandy that such matter would wash right out. They made a great growth. They were seeded one and one-half bushels per acre, and yielded a return of seven tons per acre. These were then turned in and seeded with rye, and no other fertilizer used, and a most remarkable crop of rye resulted. This shows that the pea gathered its nitrogen from the air, and I regard it as a most remarkable plant. I think it will grow in any section of the State. It must not be sown until the ground is warm, and it will mature in about two months.

Mr. J. S. Collins—How would it do to sow them after the last farming of the corn crop?

Professor Voorhees—That will work very well, I think. We expect to give this a trial next year.

Professor Van Deman—That is one of the common practices in the South. When they have farmed their corn they go in with hoes—they are about fifty years behind the times there—and plant the cow-peas. They yield a very considerable crop. I hardly think the

farmers of New Jersey realize the benefit to be derived from the cow-pea. They are doing well in New York, and they will grow on land that will not support crimson clover.

Mr. Roberts—How about sowing them in the orchards?

Professor Van Deman—In southern Missouri they have found the cow-pea is just the thing for this purpose. They begin working the soil in spring as soon as they can stir it safely, and they have their orchards planted so they can farm them both ways. They go through their orchards three times with the disc harrow, and they have calculated to a nicety just what this costs for thousands of acres. They find that the cost of cultivating in this way three times is just about the same as once plowing. This work is done at the most opportune time, right in the early part of the season, when a large part of the growth is made.

Governor Hoard—That is the way they cultivate in the fruit orchards in San José.

Professor Van Deman—Yes; but they don't run the harrow right up to the side of the tree.

The Chair—Is it necessary to cultivate the orchard at all?

Professor Van Deman—Mr. Denise goes on the non-cultivation plan, and thinks nature method—the mulching—is the best, but I think he will see the time when he will wish his roots were not all on top of the ground.

Mr. Lippincott—How about mulching with the cow-pea?

Professor Van Deman—They did this in Missouri. At the time of last cultivation they sowed one bushel of black cow-peas to the acre. This was some time in June. These were sown for mulch.

Mr. Collins—Is that not rather early?

Governor Hoard—Not in Missouri.

Professor Van Deman—They never touch this ground again until the next spring. They let the cow-peas drop on the ground. After gathering the apples the hogs are turned into the orchard and they fatten the hogs on these cow-peas, and the next spring they do the same thing again. There is such a thing, of course, as carrying this too far year after year, for you may get too much nitrogen in the orchard.

Professor Voorhees—I do not think the cow-pea is a substitute for crimson clover. Where the crimson clover will grow it is preferable, because it lasts through the winter and prevents the soil from leaching.

I do not want you to believe that the cow-pea can be used as a substitute for crimson clover. It is another plant of a similar class to be grown at a different time. In corn it will grow until frost comes, and the advantage of its roots in the soil prevents leaching. Sow the cow-pea in the summer, but not with the idea of its being a substitute for crimson clover.

Mr. Haines—Why not use both?

Professor Voorhees—That is it exactly. Don't put the peas in too thick or you will smother out the clover.

Mr. Black—If you want the full benefit of the plants as a fertilizer would it not be necessary to turn them under?

Professor Van Deman—It doesn't make any difference. They are just as good on top, for they gather nitrogen all the time.

Mr. Black—They should be planted late, so they will not ripen the seed, I suppose?

Professor Van Deman—The seed will not bother you—no matter whether they are late or early, so far as the seed is concerned. The later they grow the more nitrogen they gather.

Mr. J. S. Collins—I would like to ask why thrifty trees do not seed as well as a tree that is diseased?

Professor Van Deman—I don't know. We might ask why animals don't breed when six months old, and many of them do not.

Governor Hoard—You might ask why they do sometimes.

Professor Van Deman—There is a period in early life when a plant is not reproductive. Trees for the first three or four years will cast their fruit. There is no doubt in my mind that one reason for this is that the pollen is not strong enough.

Governor Hoard—They are weak in the seminal principle.

Mr. Decou—I know of an orchard that was unproductive for years and was finally used for a hog-lot, in part. The trees where the hogs were allowed to run at will became healthy and vigorous and produced large crops of apples, while the remainder of the orchard, right alongside of it, was barren and unproductive.

Professor Van Deman—I believe the same can be said of these trees. The pistillate is so weak it will not carry the pollen grain to its destination.

Governor Hoard—In other words, it is a case of abortion.

Professor Van Deman—Hardly abortion. It would be more like a failure of conception.

Mr. Clifford—I know of a case where the outside rows of an orchard of Baldwin apples bear better than the rows further in the orchard. How would you account for that?

Professor Van Deman—That opens the whole question of pollination and of fertility.

The Secretary—The orchard wants more plant-food.

Professor Van Deman—It is hard to tell just what may be the cause. The Baldwin apple generally pollinizes itself all right.

Governor Hoard—What form of potash do you prefer?

Professor Van Deman—The muriate is preferable, I think.

Governor Hoard—How about ashes?

Professor Van Deman—Nothing better, if good. The trouble is, however, that many ashes are leached and have no potash in them. If you can get the ashes unleached, there is nothing better for fruit trees. Under the circumstances, it is cheaper and better to buy the muriate of potash.

Governor Hoard—In what quantity would you apply the muriate?

Professor Van Deman—About 200 pounds of muriate of potash, 200 pounds of dissolved bone and 100 pounds of nitrate of soda. I think these are the proportions as I have given them in the paper.

A vote of thanks was extended to Professor Van Deman for his entertaining and instructive address.

THRIFT ON THE FARM.

BY GEORGE T. FAIRCHILD, LL.D.

THRIFT ON THE FARM.

Mr. President and Gentlemen of the Board of Agriculture—When I was asked a few days ago to take the place left vacant by Assistant Secretary of Agriculture Brigham, I thought it would be impossible for a man of my size to accomplish it. Those of you who are familiar with the physique of Mr. Brigham will readily believe the story of Oliver Wendell Holmes, who, when he was asked to fill a certain chair, said no, but he would rattle around in it a little while. [Laughter.] Mr. Brigham covers more ground than I can cover.

Moreover, in choosing this theme I have felt a little embarrassment, because the question of thrift often takes on a local color. Thrift, as you know, is really that which belongs to your own experience applied. As I have listened to the discussions here for the past two days, I have become convinced that my theme is intended only for those farmers who do not come here. The unthrifty farmers are not here. Thrift on the farm is to be urged upon those who have not found it, and such farmers are not here. Still further, as I have listened to the admirable talks upon farm matters, especially upon dairy farming, I have felt the little I could say, as a looker-on, could have, perhaps, comparatively little interest to you, who know so much better than I do the principles of thrift. I will, however, try to stick to my text, and say a few words about thrift upon the farm. I notice, as it has been said, that the looker-on sees most of the game, and the energetic player has to have someone else tell him how the game is going sometimes.

To my mind thrift means a long look ahead. It is the taking into account of all the energies at hand, and the putting of these energies into effect where they will bring out the largest result in the long run. Any other thrift is a shift, and not thrift.

I propose to discuss the subject to-day under three special heads. First, the thrift that pertains to the farm. No man is thrifty as a farmer who cannot see his farm at the end of his life better than when

he took it. You, yourselves, realize that. He must think of his farm as a bank account, to be drawn upon again and again, but always to be kept full. Too many of our farmers think of it as an endless account, to be drawn upon perpetually. Many of them even make overdrafts upon this account without regard to its future. You have talked here during the last few days, most eloquently, to me upon the supply of fertility to worn-out soils. The problem is really to keep your bank account in the soil good. Keep the bank account full, and the best of you are doing this. You are adding to that bank account so that, year by year, you are making more fertile soils—a soil which has more of the elements which belong to plant life, where they are constantly working up to the highest possible level for the work to be done with the farm. This is the result of thrift. Make your soils from year to year larger in the elements necessary to increase this farm bank account. I will not, however, dwell upon the ways in which you are doing this. You can tell them better than I can. You know how to find the elements of fertility. You are looking upon it further as something which must be kept up.

We make the complaint in the Western world that most of the weeds come from the old farms. There are two reasons for this, in my opinion. You have a larger range of soil from which to draw. The air and moisture must live together in the soil, and a soil saturated with moisture gives nothing; a dry soil, saturated with air, will not give you anything. The soil must be of such depth and fertility as to give you air and moisture combined constantly, and the moisture in such condition as to be readily taken up by the plants, and not in greater amount than will afford ready access of the air to the soil. You must think of this. The condition of your soil is steadily and constantly improving, with reference to fertility, if you are thrifty. Moreover, you are thrifty in so far as you keep your farms clear of everything except that which you wish to raise.

In your discussion this morning with reference to the fertility of your farms, you have had to bear in mind the future results and the condition of your lands with reference to future crops.

Nothing strikes me so much, perhaps, in going through the old farming communities, as the amount of foul plant life that crowds its way into the whole range of fertility of growth. It was said this morning that the cow-pea could be smothered out with oats; and it is equally true that all our plant life can be smothered out by some

stronger growth of plant life, whether foul or useful. I will not dwell on this, however. The presumption is the farm is something more than a bank account; it is a machine. Just as truly as the manufacturer must look after his machinery to see that every part is properly adjusted to every other part, so must the farmer look after everything pertaining to his farm and belonging to his farm machinery, utilizing strength and utilizing time, and every possible advantage. The farm is a machine that must be built with reference to all these things, and which must be contrived and studied with reference to its range of products. Remember, the only thing man can do in this world is to move things. Lord Bacon said so 300 years ago. All he can do is to move things to and from each other, and nature accomplishes the rest. You are moving the seed and soil together, and the sunshine and shower give you your crop. You need to know just how to do that with the greatest economy of time and power, and this is thrift. This machine, so far as the conveniences of the farm are concerned, is to be adjusted just as carefully as the manufacturer adjusts his machinery. You have invited Governor Hoard to come here from Wisconsin to give you the science of dairy farming, to tell you how to adjust the machine for the best results along this line of farming, and you are studying this machine, if you are thrifty, as I think you are. The greater part of this machine study is the result of growth, as much as by the accumulation of experiences of the past. How can I bring my orchard in ten years to yield its approximate production? This machine cannot be perfected inside of ten years, and the study must be put upon it for these years beforehand, to manipulate it until it becomes the perfect and complete machine. One of our fruit-growers in Kansas told me he came to Kansas among the early settlers, with the idea that it was a good location for the development of mercantile orchards. No one had experimented to an extent that made it safe for him to invest in certain varieties of fruits for such an orchard as he contemplated. He must build his machine, and it would take years and years to get it perfected so as to bring him the profits he had a right to expect. He told me he had spent eleven years doing nothing but experiment in different varieties of trees, with a view to finding a thrifty tree for his orchards. The varieties I gave you last night are those he settled upon in the very beginning in his first orchard, as those best adapted to that region, and those best adapted

to the markets. Then he built his machine as firmly as possible, with reference to immediate profits, and he has not, in the fifteen years since he completed it, changed his mind at all.

The Chair—Not even on the Ben Davis?

Dr. Fairchild—That is the first choice with him.

Professor Van Deman—I understand he has dropped the Winesap.

Dr. Fairchild—He is still marketing the Winesap. He has not extended his plantation with these, because it is an apple that is prone to overbearing, and in his method of culture this is a very serious fault. The apples are small, and therefore, although he is still marketing the Winesap, he does not expect to plant any more of them in the future.

Mr. Roberts—I understand he raises the Jonathan; what kind of an apple is that?

Dr. Fairchild—It is a full, red apple—not a very thrifty bearer—and no very large crops are raised, although it is so fine he still adheres to it. It is about the size of the Ben Davis, on the average, although it never grows quite so large as some of the Ben Davis apples.

Mr. J. S. Collins—How about the Gano?

Dr. Fairchild—That is the Ben Davis improved. You could hardly tell the difference between them on the market.

However, I am not to talk to you about apples, but I am glad to see the thrifty farmers looking out for what I have said a thrifty farmer would. He must study the models of other machines, of other orchards, even if they are not models of culture or growth. He must study to improve his machines, using the knowledge of others, so far as attainable. These orchards I have spoken of are not models of thrift or of culture, perhaps, but they are commercial orchards, built up with a view to getting the most profit out of the plantations.

Mr. Roberts—Does he cultivate them?

Dr. Fairchild—Yes, sir; the point I want to make is that this machine cannot be built at long range, but that it must be the result of close study as to future needs and future developments.

Governor Hoard told us yesterday about building up a dairy herd. You can't get it ready made. There is no hand-me-down in that range of work. The dairy herd that is the machine to do this work

well is built up by long study of the manufacture or contrivance of it. The farm is the machine to aid you in this work. It is a permanent investment, it is stable capital.

I don't wish to dwell on this part of the theme, but the main point is that true thrift concerns the farmer more than it does the farm. The farmer makes his farm, and he must be thrifty with reference to himself. I am glad to see the thrifty men quizzing even a looker-on in relation to the business that makes him a business man. Business information comes first, and then business skill is next, and side by side with it. The two must grow together, for it is impossible to get either ready made. Learning to see is the problem of life for all of us. Learning to know is learning to see, and we do that by handling the things that concern it by doing, and by applying constantly each item of perception as it occurs to us. I venture to assert that Governor Hoard in this assembly can learn more of dairying than any other member of it, because he knows more about it already. [Applause.]

The Secretary—Is that intended as a reflection on the rest of us? [Laughter.]

Dr. Fairchild—I picked him out because he does not belong in your neighborhood. [Laughter.]

Governor Hoard—The rest of them ought to have your profound sympathy. [Laughter.]

Dr. Fairchild—The one who knows most is the one who can learn most in any connection. We are interpreters of nature, and if we succeed in anything on this line it must be by obeying nature's laws—there is no other way. We must seek into nature, must feel the philosophy of nature and her powers, if we would succeed, and you can do nothing except as you interpret her correctly. You must understand nature's rules, and to do this you must yourself be informed by touching and handling the things which are in nature. The farmer who would be thrifty looks into that with reference to himself, and makes the most of everything that concerns his farming, and the most of the skill in all that concerns his business. He must feel constantly that this machine which he has built up, or which has come to him from his ancestors, must be useful to him as he puts himself into it. He is a business man. You will find the knowledge you have of the world in which you live, as you apply it in the tillage of the soil, adds the only profits to your industry.

The great mass of those who are raising our staple products are barely getting a living. The man who puts himself into his product, and brings it into the best shape, is the man who gets fifty cents per pound for his butter. He is the man that raises the strawberry, or the apple, or the product that people want. He is the one who sells the water off his farm to his own advantage. He is the one who finds out what his customer wants in the particular kind of water, and furnishes it to them at the highest market price. If he tries to sell it to them when they don't want it the Board of Health steps in and he is thrown out of the market and crushed. It is impossible for him to build himself into a profitable man to himself unless he understands how to adapt himself to the wants of the consumer.

The farmer must be a citizen, for in all this United States the farmers are the citizenship in large measure. As a citizen, the farmer must take a longer look ahead; his range of vision must be enlarged if he would be thrifty on the farm. He must be informed as to legislation, and as to the best means of national greatness and prosperity, in everything pertaining to the future of his country, and he must act in accordance with his convictions as to what will best tend towards this future prosperity. I am not talking about party independence, for I have no sympathy with the man who votes against a man he dislikes simply because he does not dislike the man who is away off from his knowledge or acquaintance. Study the conditions bearing on the questions at issue, and act according to what constitutes thrift in your business, your future prosperity, for the farmer as a citizen must be thrifty. A good portion of your time here has been occupied with reference to legislation. Many of you have been in the Legislature, and you have found it is utterly impossible for a man to be a good citizen and think only of himself. The range of power comes by being a power for good in your own community, and you can use your power best by knowing best what your community needs as a community.

The really thrifty farmer is more than a citizen. He is a man. A man who would be thrifty on his farm in the long run has to look at himself as one who is growing into a larger life. He must remember his birthright as a human being. He is an animal, and he eats and sleeps and grows as another animal, but if he thinks no further for himself than his swine where is he? It is said that the ideal of many men in the West is to buy a piece of land to raise corn

to feed hogs, to buy more land, to raise more corn to feed more hogs, to buy more land, to raise more corn, to feed more hogs, and so on indefinitely.

The farmer who would be thrifty must have ideals above this. If you will compare the sage with the savage, the lowest with the highest type of enlightened farmer, you will find that the chief difference lies in the fact that the enlightened being has the largest bundle of wants, and the energy that comes from wanting something he has not is the chief source of the power that is in him. Our civilization to-day has great wants. With many men this greater bundle of wants means added power. If not he had better be a clam, and done with it. A good fat clam has all his wants supplied, but he can never be anything but a good fat clam. The man who has all his wants supplied can never be anything better than he is.

Then, in the third place, the long look ahead is further in advance than the farmer, something grander than the farm—the farm home. The farmer who is merely handling the soil as a machine is ready to sell out to the first comer who offers a little more for his machine than he has been in the habit of estimating its worth, while the truly thrifty farmer looks upon the building of his farm home as a home that shall be perpetual from generation to generation. We must look at it as a home for the future. We have settled just so much territory, to become the farm home of the family from generation to generation. Is there any better crop on any farm in the universe than the children that grow up on it? Is there any stronger interest for you or for me than the development of the household which shall come after us, for added power? Is anyone thrifty who neglects the children in the least item of their life? Is anyone of us truly thrifty who does not think of their health, their physique, their information, their necessities for growth in the interpretation of nature and nature's laws? Who does not think of the character they are to build, and of all that belongs to them? Who does not think of them as the men and women who are coming after him? My friends, the thrift of life belongs to the look into the next generation. Do you ever think how much of us goes into the procreation of the future? How the kindly affections are planting themselves to make future life in this world? I have hopes of a future life for myself individually, and that the future life has need for me, because in my children I realize that this work of the universe goes on forever, that the power

I have put in my children as men and women can never be taken from them. The growth they have made as the offspring of myself is represented by the manhood and womanhood they have.

Can any thrift on the farm be worth the consideration of really sensible people when the farm home for the children is not taken into account? There is a more selfish consideration than this. I see that grey hairs are not wanting here, although there are not many. We are all coming to the time when the farm home will be the comfort of life in a good old age. It is a wholesome place to grow old in, and it must be grown into as a home. There is no other way to get it. The farm home for the old folks, who have bred up their children in it, is the only true home for them, and they seem to be a part of it. Then when they are ripe in years, and rich in their experience, they give up the burden to younger and stronger shoulders—to their children. I believe in children myself, and I believe in giving them all that God intended they should have, that they may be a help in the old age of their parents.

A farmer went to a Western State from northern Ohio, and chopped his farm out of the woods. He had 120 acres, and had his children growing up all about him. There were no schools, so he said to his neighbors, for every day one of them would chop for him he would teach their children a day, and for three years he kept up this school, while his neighbors did an equal amount of chopping for him. In all that neighborhood his influence was felt, for he was the builder of that larger, greater crop that was to come in future years. Thus his eight children were brought to maturity, rich in life. Six of the eight he carried through a course of study. He gave them the opportunity of life, and the farm, lessened by ten acres, was the machine by which he gave them a larger life. The eldest son took up the burden when the father tired of it, and there was room for two houses on the place. The old folks settled down, and the young folks took up the burden. Fifty years ago this man had the first farm journal in the neighborhood—away out in the woods. All his thought was to keep his children in contact with the world of thought, and the world of power. At the age of 98 he was buried. The farm of 110 acres had supported the father and mother—the mother died at 80; it had given to the children the opportunity of education, and it paid the expenses of a long-delayed death, and when his children gathered around the coffin and lowered him into

the grave, do you believe there could be any regret that he did not leave a fortune behind him to be quarreled over? He had left in every one of those sons and daughters power worth more than fortune, an enjoyment that cannot be measured here or hereafter. This, then, my friends, is what we should look forward to in the long future, while we keep well in hand the course of the present. [Applause.]

Governor Hoard—I am very much obliged to Brother Fairchild for the beautiful moralizing he has given us. In regard to the building up of the larger harvest in his children he has touched upon a point that interests us all deeply.

I have been making some little studies here while listening to him, and I want to tell you about them. I want to talk to you about an ear of corn.

I have heard people say a whole lot of things about an ear of corn, and I have found that thousands and thousands of farmers have never even thought of studying this simple thing. It is astonishing what facts people will live alongside of and never study. One old lady told me she had lived with her husband for sixty years and she didn't know the man until he died. [Laughter.]

I have heard a great many farmers say that this corn on the small end of the ear was deficient in fertility and that the strongest kernels were at the butt of the ear. I said I would find out. I have tried it three times, planting a straight row from the butt to the top of the ear, a whole row in the field representing a whole row from an ear of corn. I have tried this for three years, and I find the fertility is just as great at the small end as it is at the butt, even if the kernels at the top are not best. You can do your own moralizing. I have found lots of barren stocks in the row, and if you will go into a cornfield you will be surprised to find what a large number of stalks are barren. Do you know why? I wish you did, for I don't. There is a lack of potency, and there is this lack to be found in everything, to some extent. Take a litter of pigs. There is always one pig that will assimilate its food better than the average and produce more growth; possibly double what the others will do. He has that strong power of assimilation and growth. The same applies everywhere in nature and is shown in these kernels of corn. I have reasoned this way, but don't know whether I am right or not. The potency of each kernel governs the future history of the stalk. I have tried this experiment

with the corn, and have done something my neighbors have not done. Everyone selects seed-corn by the appearance of the ear, and the gentleman who brought this did not bring you any deficient ears. I have here two ears of corn, and, if you were asked which you would select for seeding, ninety-nine out of one hundred would select the best-looking, judging by the appearance of the ears. Gentlemen, this is a foolish notion, as truly as you live. I have found in many fields as high as 15 and even 20 per cent. of the stalks were barren, and this makes a very great inroad upon the yield. I went to selecting the seed-corn by the character of the stalk, and not by the looks of the ear. I found at once a wonderful increase in the yield of corn per acre. I went into the field and noted the character of the stalks, noting those which grew strong and vigorous, and in almost every instance selecting the stalks that produced two ears instead of one. Fecundity, fertility, disposition to do something, motherhood was what I wanted, and it was by this I selected my seed-corn, and not by the appearance of the product. This was the result of a little bit of experimental thinking. I am exceedingly interested in this, and I am going to pursue it a little further.

In regard to clover-seeding, we often find it extremely difficult to keep up the character of our clover-seeding. We have seeded with barley, wheat and oats, and the seed has got a good start, and the first thing we know there comes a dry spell, and down goes the clover. Did you ever have this experience?

I have noticed this: Farmers sometimes have cut some of the green oats to bait their horses, and where this was done the clover would be in fine shape, and everywhere else in the field it would be dead. Now, what was the reason? Sunlight, you say. No. The oats took out of the soil more water when perfecting the grain than at any other time. They robbed the clover of the moisture during the perfecting of the grain. I decided this was the cause, and I cut my oats for hay, and we had some perfect crops of clover. I have never failed to keep the clover alive in this way. It is just the same with barley, cutting it just before it begins to perfect its grain, making hay of the crop. It is worth as hay just as much as timothy, and there is no hay so poor as timothy for cows. Oats make good hay, but not as good as clover.

Mr. Black—We have seeded for rye and then cut for hay. I have cut clover three feet high from the same ground afterwards.

Governor Hoard—About handling clover. I have seen Hiram Smith cut three tons to the acre from clover nine years old. He was a good manager of clover, and he worked on this principle, that the clover should never be allowed to go to seed. It was not even allowed to approach the formation of seed. As long as you can prevent its seeding it will live, and as soon as it seeds it dies. The old man cut two or three crops a year, and kept it from going to seed. Nature kept struggling to produce the seed, and he kept cutting it; the plant lived and he had good, strong meadow hay, for nine years, from the same seeding. We should not forget nature's law with regard to clover—once it seeds it commences to die. Have you ever noticed that as soon as the clover goes to seed the meadow commences to perish? Cut it just when it commences to blossom, and before the seed commence to form. Some of you say you have catchy weather then, but it doesn't cost much to make a clover-cap, with a yard of cotton cloth, a yard wide. Fasten a string to each corner, and tie a stone to the string, and there you have it. A hay-cap of this kind is one of the nicest little conveniences I ever saw. We have had them in use twelve years, but they have been taken care of.

STATE GRANGE REPORT.

BY JOHN T. COX, MASTER.

STATE GRANGE REPORT.

To the Officers and Members of the State Board of Agriculture—I beg leave to submit the following as the report from the New Jersey State Grange:

We report a steady and satisfactory growth of the order in the State. Farmers are coming to appreciate more and more the great benefits to be derived through this organization. The co-operative feature of the Grange is getting to be more thoroughly understood, and in consequence is becoming more efficient. There is in this not only the saving to the individual to be considered, but through these methods they have learned *how* to buy to better advantage. This feature is greatly reinforced by the education furnished in the Grange. Take the matter of fertilizers as an instance; the farmer is not only able to buy cheaper by uniting with his neighbors, but he has learned to know just what he wants to buy to give him the certain desired results, and he has learned just in what form and in what proportions the various ingredients should be combined, and so all along the line the Grange has been made the farmer's great school. Therein they learn parliamentary law; they learn to discuss calmly the great questions that concern their interests; they learn how to conduct public meetings, and to speak upon public occasions; they have learned that in the matter of insurance they can save one-half of what it formerly cost them.

In the matter of legislation, the State Grange has placed itself on record as asking for the amendment of the present game laws, so as to permit farmers to take game upon their own lands in *any manner* during the open season. They also claim that they should by law have the right to destroy rabbits at any season of the year, when it is necessary to the protection of their trees and crops.

We believe that the farmer should have a prior right to that which grows upon his farm rather than the sporting man. We also favor the repeal of that law, now on the statute-books, which would forever

prevent any trolley road from carrying freight or express matter for the people living along the line. This is, to say the least, an unjust and unfair restraint of trade, and is practically a stipulation on the part of the State that our citizens *shall not* organize a company to carry the products of the farm and factory to their proper market in competition with other corporations. This law, we take it, is clearly in contravention of the Constitution of the United States, and we insist upon it that it ought to be repealed without delay.

We are still in favor of the free delivery of mails in the rural districts, and will use every possible endeavor to secure such an enactment. We are in favor of pure foods and drugs, and are opposed to all fraudulent products. We ask for only reasonable and fair rates of transportation, but we do object when the common carrier gets more than the common grower. As an illustration of the present unfair rates, I want to say that it costs the farmer more to transport each basket of peaches from Hunterdon county to New York City than it costs the wheat speculator to transport each bushel of wheat from Chicago to New York City, even by the all-rail route.

The State Grange, at its recent session, appointed a committee of three to visit the State Agricultural College and Experiment Station. It is desirable upon our part that the very friendly and cordial relations existing between these institutions and the State Grange shall be continued. The members of our order have done much to make it pleasant and agreeable for those who have had charge of the Farmers' Institutes throughout the State, and have lent material aid to their success and value.

Mr. Roberts—If allowed, I wish to say a word about the game laws of the State, referred to in the report of the State Grange.

I never could understand the inherent right of anyone to go on lands belonging to another—who pays for them and pays taxes for them—and claim a right in the possession of any of their products, whether wild animals or whatever it may be. [Applause.]

I never could understand why it should be unlawful for farmers to kill rabbits, or other similar pests, on their farms, except at certain periods of the year. It may be the law, and I claim to be a law-abiding citizen, but if the rabbits destroy my trees, be the season what it will, they shall die if I can kill them. [Applause.]

The Chair—The game laws are problems which are constantly

coming before the Legislature. When I was a member of the Legislature I was on the committee having this in charge, and we had more trouble in preparing laws for hunting game than anything else, and then they were not satisfactory. It is awfully trying to have people running over one's property for game. I cannot see why they should have such a right. How do they get it?

Mr. Roberts—They have no right.

The Chair—I agree entirely with Mr. Roberts, and if I found rabbits destroying my trees I would take care of them if I could, no matter whether in season or out. Every farmer is justified in taking care of his property.

Mr. Holdrum—Last year in the Legislature we had a great deal of talk and confusion about the game laws. We had many people before us, and we held meetings at different times, and finally formulated and reported a bill, such as we best could, which made the season the 1st of December. This bill failed to become a law, but something may come of it this year.

The Chair—They have been tinkering with the game laws for twenty years, and I think it is time the farmers had something to say relative to their rights on their own land. They should be heard before anything further is done.

Mr. Holdrum—They had hearings at different times. People were present from all sections of the State, and we tried to accommodate as many as possible, but did not seem able to get the bill through. The farmers as well as the sportsmen were present.

Mr. Lindsley—The State of New Jersey never had a foot of ground it did not buy, and the Legislature ought not to interfere in the interests of sportsmen as against the interests of farmers. The rabbits are a product of our farms, and every farmer knows if they are not destroyed they will destroy his crops. They multiply very rapidly. You may have a spring or a stream on your farm, and if you stock it with fish, they say you shall not catch those fish except with a rod and line. It is a ridiculous thing for the Legislature to say what the farmer shall or shall not raise on his farm, or how he shall gather what he has raised, and it is equally ridiculous for the farmers to submit to such an imposition.

Mr. Cox—I have for a long time thought the game laws were clearly unconstitutional, in that they say that the product that grows on my farm belongs to some other fellow, or that some other fellow

has the right to gather those products, if he can do it without my catching him there. There is neither equity nor justice in a law of that character. The farmer himself can do nothing except during the game season, and only then by his gun. Is it not absurd to say that this game shall be taken only at a certain time and in a certain way? Perhaps some of us are not good sportsman, and don't want to be obliged to kill the game in a certain way. We have not time to go to the house for a gun. The law also says that boys shall not trap them. In this way the game is saved for the sportsmen, if they can get at it without being caught.

The Chair—The farmers' rights are being taken every year, not only by the sportsmen, but the trolley companies and the telephone companies run right through his lands, and after a while the deed for his property will not do him any good. Farmers must assert their rights, and they will fare better.

Mr. Holdrum—I suppose a man who has property can put up signs and prevent trespass.

Mr. Cox—You can't keep them off. Suppose you have a 100-acre farm, and your buildings are at one end of the farm; they gather up all the game before the owner can get to them. The proposed protection by the trespass law amounts to nothing. The only way to secure protection is to go before the Legislature and demand your rights, and when the farmers are ready to do this the Legislature will pass such laws as they want. [Applause.]

Mr. Roberts—A notice to the gunners to keep off does not keep the rabbits off, and I notice the rabbits are as bad as the gunners. [Laughter.]

Mr. Collins—It seems to me this discussion is all one-sided. It has been the custom in other years to invite the Governor to come before the Board, and if you ask him in he may be able to give us some good advice in the matter. He did not sign the bill when passed, and he may be able to explain why it was not signed; he may tell us some reason we never thought of.

The Chair—We will invite him in if he is here.

Mr. Holdrum—I do not know that the bill as passed would suit the farmers altogether, although it was an improvement on the present law.

Mr. Fitzga—I don't think there is a worse law in the State of New Jersey than the game law. The law now is only for the sportsman.

Year after year this game law is changed in some way, and I do not think there are many farmers who know or understand it. There is the rabbit law, the quail law, and the partridge law, and they should all be alike, for when I go after a rabbit and see a quail or a partridge I shoot it. [Laughter.] It is only made so that the sportsmen may get the cream of the game, because they keep posted on the law. It only gives them an excuse to run over your land that much oftener. The more the law is tampered with the worse it gets.

Mr. Roberts—There was a time long ago, under the feudal laws, when the ground game, as it was called, belonged to the lords of the soil, the nobility; this was one of the perquisites of the gentry. Tenants who leased land had no right, under any circumstances, to kill any of the game on the land. It was a transportable offense to do so. We have all our game laws as a legacy from that old feudal period. I do not think we need such laws now. Our forefathers once declared their independence of these laws, and I think it is time for us as agriculturists to declare our independence of this old feudal system. [Applause.]

Mr. Tine—We are losing sight of what the farmer wants, and that is that he may be allowed to kill rabbits at any season of the year, if found on his own land.

Mr. Peck—As a body of farmers there should be no difficulty in securing what we want, for in union there is strength.

The Chair—It is all right for you to express your opinions, but if you want to do anything you must get together and go before the Legislature—that is your starting point. If the farmers will go before the Legislative Committee in a body and present their claims, I have no doubt the committee will pay attention to their wishes, and the Legislature will pass a law which will be satisfactory to the farmers. Go to headquarters if you want to do anything. If you feel enough interest in the matter to do this your remedy is at hand. [Applause.] It will do but little good to ask for this as individuals.

Mr. Lindsley—This Board is made up of delegates from every county in the State, and I would suggest that this matter be referred to the different County Boards, and then have them report their desires at the next meeting of this Board. That will give the farmers a chance to be heard.

Mr. Holdrum—That might be a good idea. Let the County Boards express themselves to this Board. How many farmers of the State

understand this law thoroughly? I do not believe that many of them know what are the provisions of this law.

Mr. Fitzga—The suggestion to bring it up in the County Boards is a good one. Last year the Somerset County Board brought up a resolution that it should be wrong to have anyone pass through our fields with hounds without our consent. This was presented to the Legislative Committee of this Board and it became a law. I think if each county would take this up we could do something. We must be unanimous in our demands, and we can have a game law that will benefit the whole State. If you pull in different directions you will get nothing. But why wait another year? Let us have this done this winter.

The Chair—North Jersey wants one law and South Jersey another. They don't seem to unite among themselves on what they want.

Mr. Holdrum—The law as passed last year provided for both sections. Come to some understanding of what you want, and I am with you.

Mr. Roberts—The thing that troubles me is that the public of our own or other States shall have any rights on our lands. That is the principle I fight against. In the forty years I have been farming I have not thought it worth while to put up notices. I don't like to have these people running over me, but they are a less nuisance than the rabbits, and we have always treated them kindly. They have killed a great many rabbits, much to our satisfaction. So far as taking the game, they are welcome to it, but what we protest against is the principle that we have no right to kill rabbits as we desire. So far as I can see, it is just as fair to pass a law preserving the rats in your barns—and rat-skins make elegant gloves. The rabbits are just as detrimental to the fruit-grower, and we want to get rid of them without being compelled to shoot them and not kill them in any other way. [Applause.]

The Chair—I do not object to their killing the rabbits, but the gunners also kill the birds.

Mr. Cox—It seems unnecessary to waste a whole year's time waiting. I believe, so far as my information goes, that farmers think they ought to have the right to kill rabbits on their farms, whether doing them damage or not. We think the farmers of the State ought to have the right to catch rabbits in any way they deem fit or desirable, whether in the close or open season. I believe the farmers of

the State are united in this—the desire to kill rabbits at any season of the year and in any manner on their own lands. We are ready to go to work on this basis, and I think the men here to-day will adopt such a resolution and place it in the hands of the Legislative Committee for action. Let Mr. Holdrum help them put it in shape. The question of the time of opening or closing the season does not enter into it at all, but the question is, can the farmer take this game in any manner he sees fit and can he destroy the rabbits or other game when injurious to his trees?

Mr. Holdrum—I would move that a committee of five be appointed to draft such a resolution.

The motion was agreed to.

The Chair appointed Emmor Roberts, J. T. Cox, Joseph Fitzga, Oscar Lindsley and H. O. Newcomb as a committee to formulate a resolution covering the desired changes. (For resolution, see minutes.)

OFFICERS OF THE STATE GRANGE OF NEW JERSEY,

PATRONS OF HUSBANDRY, 1898.

OFFICERS.

Master	JOHN T. COX	Readington, Hunterdon county.
Overseer	NICODEMUS WARNE	Broadway, Warren county.
Lecturer	GEORGE L GILLINGHAM	Moorestown, Burlington county.
Steward	EDMUND BRADDOCK	Medford, Burlington county.
Assistant Steward	GEO. W. F. GAUNT	Mullica Hill, Gloucester county.
Chaplain	FRANKLIN DYE	Trenton, Mercer county.
Treasurer	CHARLES COLLINS	Moorestown, Burlington county.
Secretary	M. D. DICKINSON	Woodstown, Salem county.
Gate Keeper	E. E. HOLCOMBE	Mt Airy, Hunterdon county.
Pomona	NETTIE WELLS	Bradevelt, Monmouth county.
Flora	MARY R. BROWN	Swedesboro, Gloucester county.
Ceres	HANNAH C. HOLCOMBE	Mt. Airy, Hunterdon county.
Lady Assistant Steward	EMMA C. WEBB	Hanover, Morris county.

EXECUTIVE COMMITTEE.

JOHN T. COX	Readington, Hunterdon county.
JAMES H. BAIRD	Marlboro, Monmouth county.
GEORGE E. DE CAMP	Roseland, Essex county.
THOMAS BORTON	Mullica Hill, Gloucester county.
JOSEPH S. GLASPEY	Bridgeton, Cumberland county.
M. D. DICKINSON	Woodstown, Salem county.

STATE GRANGE MEETS THE FIRST TUESDAY IN DECEMBER, 1898.

POMONA GRANGES.

MASTERS AND SECRETARIES, WITH ADDRESSES.

1. Burlington	Master	G. FRANK HARVEY	Columbus, Burlington county.
	Secretary	GEO L. GILLINGHAM	Moorestown, Burlington county.
3. Hunterdon	Master	WM DUBON	Pittstown, Hunterdon county.
	Secretary	BESSIE D. SKED	Rocktown, Hunterdon county.
6. Salem	Master	ALLEN MOORE	Woodstown, Salem county.
	Secretary	EMILY BORTON	Woodstown, Salem county.
8. Gloucester	Master	WALTER HERITAGE	Mickleton, Gloucester county.
	Secretary	CADDIE J GILL	Swedesboro, Gloucester county.
9. Centre Dist.	Master	A E. HEDDEN	Verona, Essex county.
	Secretary	ALEXANDER WEBB	Hanover, Morris county.
10. Warren	Master	N. WARNE	Broadway, Warren county.
	Secretary	C. T HEITSMAN	Broadway, Warren county.

COUNTY DEPUTIES.

Burlington	Wm. B. Lippincott	Hartford, Burlington county.
Camden	Amos Ebert	Ashland, Camden county.
Cumberland	W. S. Bonham	Shiloh, Cumberland county.
Essex	W. W. De Camp	Roseland, Essex county.
Gloucester	Barclay D. Kille	Swedesboro, Gloucester county.
Hunterdon	I. H. Hoffman	Baptisttown, Hunterdon county.
Mercer	Theodore Cubberly	Hamilton Square, Mercer county.
Monmouth	John Statesir	Colts Neck, Monmouth county.
Morris	Leo F. Kitchell	Hanover, Morris county.
Salem	Clark Flitcraft	Woodstown, Salem county.
Somerset, Bergen, Passaic and Middlesex	J. B. Rogers	1195 Broad St., Newark.
Sussex	John Dekay	Papakating, Sussex county.
Union	J. B. Ward	Lyons Farms, Union county.
Warren	Nicodemus Warne	Broadway, Warren county.

SUBORDINATE GRANGES.

	GRANGE.	MASTERS.	P. O. ADDRESS.	SECRETARIES.	P. O. ADDRESS.	LECTURERS.	P. O. ADDRESS.
5	Swedesboro	J. Herbert Brown	Swedesboro, Gloucester co	E. C. Warrington	Swedesboro, Gloucester co	Lizzie P. Turner	Swedesboro, Gloucester co.
3	Moorestown	Joseph Engle, Jr	Hainesport, Burlington co	Hanna D. Engle	Hainesport, Burlington co	Leon Collins	Merchantville, Camden co.
9	Woodstown	Richman Coles	Woodstown, Salem co	A. B. Waddington	Woodstown, Salem co	Mary Waddington	Woodstown, Salem co.
1	Vineland	H. R. Ingalls	Vineland, Cumberland co	Ann Chalmers	Vineland, Cumberland co	Richard Johnson	Vineland, Cumberland co.
2	Ringoes	E. N. Strong	Ringoes, Hunterdon co	Bessie D. Sked	Rocktown, Hunterdon co	P. H. Hartwell	Lambertville, Hunterdon co.
4	Edgewood	H. S. Wright	Burlington, Burlington co	Edmund Cook	Burlington, Burlington co		
3	Hopewell	L. F. Glaspey	Shiloh, Cumberland co	W. S. Bonham	Shiloh, Cumberland co	J. B. Hoffman	Shiloh, Cumberland co.
3	Cumberland	Henry Bacon	Greenwich, Cumberland co	Maurice Goodwin	Greenwich, Cumberland co	M. W. Goodwin	Greenwich, Cumberl'd co.
0	Fenwick	George Freas	Quinton, Salem co	W. W. Patrick	Hancock's Bridge, Salem co	Rosa Fogg	Harmersville, Salem co.
5	Harrisonville	E. Arlington Jones	Mullica Hill, Gloucester co	Belle Kirby	Harrisonville, Gloucester co		
2	Bridgeport	Joseph K. Ashton	Swedesboro, Gloucester co	B. F. Rulon	Swedesboro, Gloucester co	H A Sithens	Swedesboro, Gloucester co.
6	Medford	Arthur Engle	Medford, Burlington co	Mary A. Braddock	Medford, Burlington co	W. B. Stackhouse	Medford, Burlington co.
8	Haddon	Jos. O. Cuthbert	Ellisburg, Camden co	R. Levis Shivers	Camden, Box 93, Camden co	Amos Ebert	Ashland, Camden co.
9	Mantua	H. Hendrickson	Wenonah, Gloucester co	Wilmer Leap	Wenonah, Gloucester co		
3	Hope	A. J. Miller	Bridgeton, Cumberland co	P. L. Wheaton	Bridgeton, Cumberland co	Jos. Atkinson	Bridgeton, Cumberland co.
9	Rancocas	Joseph Lundy	Rancocas, Burlington co	J. B. Hilyard	Rancocas, Burlington co	Hannah F. Haines	Mt. Holly, Burlington co
0	Pemberton	George W. Lundy	Mount Holly, Burlington co	H. R. Lippincott	Pemberton, Burlington co	John Forsyth	Pemberton, Burlington co.
1	Mullica Hill	Aaron B. Somers	Jefferson, Gloucester co	Rae R. Conelly	Mullica Hill, Gloucester co	Mary C. Moore	Mullica Hill, Gloucest'r co.
7	Centre Grove	Wm. H. Taylor	Millville, Cumberland co	J. D. Zimmerman	Millville, Cumberland co	Jacob Zimmerman	Millville, Cumberland co.
8	Columbus	Franklin S Zelley	Jacksonville, Burlington co	Ethel W. Zelley	Jacksonville, Burlington co	Rachel B. De Cou	Trenton, Mercer co.
0	Courses Land'g	Joseph Webber	Courses Landing, Salem co	Henry Gardner	Sharptown, Salem co	E. Atkinson	Woodstown, Salem co.
1	Crosswicks	A. Satterthwait	Crosswicks, Burlington co	E. A. Rogers	Crosswicks, Burlington co		
4	Pennington	John Flemming	Pennington, Mercer co	Ira Stout	Pennington, Mercer co	Reuben Titus	Pennington, Mercer co
7	Mercer	N. Stout Voorhees	Glenmore, Mercer co	W. S. Phillips	Hopewell, Mercer co	Ralph Ege	Hopewell, Mercer co.
8	Wantage	George Vandruff	Deckertown, Sussex co	S. M. Purcell	Deckertown, Sussex co	Nelson De Witt	Deckertown, Sussex co.
9	Hamilton	A. E. Nutt	Hamilton Square, Mercer co	Thos. Q. Taylor	Hamilton Square, Mercer co	A. S. Appleget	Cranbury, Middlesex co.
1	Friesburg	Alex. D. Burt	Cohansey, Salem co	E. S. Hitchner	Cohansey, Salem co	Mariah T. Burt	Cohansey, Salem co.
5	Williamstown	John M. Taggert	Williamstown, Gloucester co	James M. Tweed	Williamstown, Gloucester co	John R. Downer	Williamstown, Gl'cest'r co.
8	Locktown	W. W. Lambert	Sergeantsville, Hunterdon co	Lizzie M. Corson	Locktown, Hunterdon co	E. M. Heath	Locktown, Hunterdon co.
0	Blackwood	Theodore Hyder	Blackwood, Camden co	C. C. Stevenson	Blackwood, Camden co		
2	Monmouth	Daniel Jones	Freehold, Monmouth co	James H Baird	Marlboro, Monmouth co	D. A. Vandervere	Freehold, Monmouth co.
9	Liberty	H. W. Polhemus	Bradevelt, Monmouth co	S. B. Wells	Bradevelt, Monmouth co	D. B. D. Smock	Wickatunk, Monmouth co.
1	Sergeantsville	James P. Dilts	Sergeantsville, Hunterdon co	K. C. Reading	Rosemont, Hunterdon co	N. B. Rittenhouse	Serg'ntsv'le Hunterd'n co.
4	Livingston	A. W. Harrison	Livingston, Essex co	Pell T. Collins	Livingston, Essex co	J. H. M. Cook	Caldwell, Essex co.
5	Morris	D. A. Hopping	Hanover, Morris co	H. E. Young	Afton, Morris co	Charles E. Bryre	Hanover, Morris co.
6	Kingwood	J. R. Kerr	Kingwood, Hunterdon co	T. W. Sutton	Barbertown, Hunterdon co	H. Rittenhouse	Kingwood, Hunterdon co.
7	Caldwell	S. E. Harrison	Caldwell, Essex co	F. C. Gobel	Verona, Essex co		
8	Roseland	John L. Conklin	Roseland, Essex co	Lillian De Camp	Roseland, Essex co	H. A. Harrison	Roseland, Essex co.
9	Enterprise	Harrison Quinby	Parsippany, Morris co	H. M. Ball	Boonton, Morris co		
0	Warren	N. Warne	Broadway, Warren co	Mary Oberley	Broadway, Warren co	Azariah Fry	Broadway, Warren co.

SUBORDINATE GRANGES—*Continued.*

	GRANGE.	MASTERS.	P. O. ADDRESS.	SECRETARIES.	P. O. ADDRESS.	LECTURERS.	P. O. ADDRESS.
1	Mickleton	Wm Dawson	Mickleton, Gloucester co	Esther L. Rulon	Mickleton, Gloucester co	Martha White	Mickleton, Gloucester co.
2	Lyons Farms	J. H. Doremus	Lyons Farms, Union co	D. H. Doremus	Lyons Farms, Union co	J. B. Rogers	Newark, Essex co.
3	Pohatcong	Henry W. Pursee	Springtown, Warren co	W. S. Melick	Springtown, Warren co	D C. Donnelly.	Springtown, Warren co.
4	Musconetcong	A. Apgar.	Junction, Warren co	Lizzie Williamson	Valley, Warren co.	J. T. Smith	Valley, Warren co.
5	Hurffville	Josiah Eldridge	Hurffville, Gloucester co	C. J. Davenport	Hurffville, Gloucester co	T. B. Kier	Hurffville, Gloucester co.
6	Rocksburg	John H. Young	Rocksburg, Warren co	Warren Herman	Belvidere, Warren co	Irwin Miller	Harmony, Warren co.
7	Washington	Daniel Fitts	Washington, Warren co	Miss Mary Lewis	Washington, Warren co.	Samuel Bowman	Washington, Warren co.
8	Mansfield	R. A. Osmun	Stevensburg, Warren co	E. J. Vosler	Port Colden, Warren co	Jacob Miller	Anderson, Warren co.
9	Oak Grove	D. M. Burd	Pittstown, Hunterdon co	W. A. C. Robinson	Quakertown, Hunterdon co	Chas. Stinbaugh	
0	Spring Mills	M. W. Angell	Holland, Hunterdon co	Mary E. Woolf	Milford, Hunterdon co	Samuel Fry	Warren P. M., H'nt'rd'n co.
1	Stewartsville	H. A. Godfrey	Stewartsville, Warren co	George B. Cole	Stewartsville, Warren co	Mrs. H. A. Godfrey	Stewartsville, Warren co.
2	Aura	John Tonkin	Aura, Gloucester co	David N. Hughes	Aura, Gloucester co	Mary R. Gardner	Aura, Gloucester co.

STATISTICAL TABLES—FARM CROPS.

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

COUNTIES.	CORN.			WHEAT.			RYE.			OATS.		
	Product compared with last year—per cent.	Average yield per acre—bushels.	Average price.	Product compared with last year—per cent	Average yield per acre—bushels.	Average price.	Product compared with last year—per cent.	Average yield per acre—bushels.	Average price.	Product compared with last year—per cent.	Average yield per acre—bushels.	Average price.
Atlantic	95	29	$0 50	100	20	$1 05	100	20	$0 72	80	28	$0 40
Bergen	90	.....	40	100	.....	1 00	120	16	40	100	.....	32
Burlington	100	36	37	125	24	95	100	18	40	50	20	25
Camden	.....	35	40	.....	27	95	.....	18	45	30	.....	27
Cape May	75	30	40	100	25	1 00	50	10	70	100	25	35
Cumberland	115	50	35	120	23	97	95	20	50	91	32	26
Essex	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gloucester	110	50	35	115	23	1 00	95	20	50	95	30	25
Hunterdon	65	27	30	110	17	95	110	19	40	70	28	20
Mercer	92	38	35	114	27	94	105	18	46	74	27	25
Middlesex	100	35	32	120	25	90	110	18	40	75	30	25
Monmouth	100	50	35	100	25	95	100	18	42	100	40	22
Morris	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ocean	90	28	40	110	20	1 00	100	12	70	102	30	30
Salem	120	55	35	125	24	95	.....	.....	.....	88	34	27
Somerset	83	27	32	125	20	91	108	18	42	54	21	22
Sussex	110	30	45	105	18	95	108	20	50	90	30	30
Union	50	20	40	40	15	1 00	100	18	50	50	20	25
Warren	100	30	35	100	.....	95	110	.....	44	90	.....	28
Average for State	.....	32	.....	.....	.....	.....	.....	17	.....	.....	26	.....

From preliminary report of U. S. Department of Agriculture.

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

COUNTIES.	BUCKWHEAT.			HAY.			WHITE POTATOES.			SWEET POTATOES.		
	Product compared with last year—per cent.	Average yield per acre—bushels.	Average price.	Product compared with last year—per cent.	Average yield per acre—tons.	Average price per ton.	Product compared with last year—per cent.	Average yield per acre—barrels	Average price per barrel.	Product compared with last year—per cent.	Average yield per acre—barrels.	Average price per barrel.
Atlantic	100	20	$0 60	90	1¼	$13 75	95	32	$2 40	80	27	$2 30
Bergen	100	30	45	125	1½	16 00	40	50	3 00	.....	.....	.....
Burlington	100	15	60	120	2	10 00	60	30	2 75	80	36	2 50
Camden	.....	.....	.....	.....	1½	10 00	.....	60	1 60	.....	60	1 60
Cape May	80	10	60	100	1½	10 00	66	22	2 00	50	25	2 00
Cumberland	.....	.....	.....	115	2¼	10 50	110	42	1 78	82	35	2 25
Essex	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gloucester	.....	.....	.....	110	2½	11 00	100	40	1 75	80	30	2 50
Hunterdon	90	.....	45	100	1¾	8 00	25	.....	2 00	100	.....	.....
Mercer	.....	.....	.....	107	1¾	9 25	50	30	2 15	90	40	2 25
Middlesex	.....	.....	.....	110	1¾	9 00	65	30	2 10	.....	.....	.....
Monmouth	.....	.....	.....	100	2	10 00	.....	30	1 75	.....	30	2 00
Morris	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ocean	.....	.....	.....	103	2¼	18 00	100	40	2 25	70	20	1 00
Salem	.....	.....	.....	120	2	10 00	120	45	1 80	85	40	2 00
Somerset	.....	.....	.....	110	1½	8 90	52	40	1 40	.....	.....	.....
Sussex	98	20	45	110	1½	10 00	20	20	2 75	.....	.....	.....
Union	.....	.....	.....	100	1	15 00	40	20	2 50	.....	.....	.....
Warren	80	.....	45	100	.....	8 00	50	.....	70	.....	.....	.....
Average for State	.....	16	.....	.....	1.50	.....	.....	68 bu.	.....	.....	72 bu.	.....

From preliminary report of U. S. Department of Agriculture.

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.	Average price.	Product compared with last year—per cent.	Average yield per acre—barrels.	Average price.	Product compared with last year—per cent.	Average yield per acre—baskets.	Average price.	Product compared with last year—per cent.	Average yield per acre—pounds.	Average price.
Atlantic	90	14	$3 00	120	21	$2 10	120	138	$0 60	35	700	$0 02¼
Bergen	30	30	2 00	80	100	2 25	.....	.....	.....	.....	.....	.....
Burlington	50	30	2 50	70	50	1 40	100	225	50	25	.....	.....
Camden	.....	45	2 20	.....	173	1 50	.....	.....	.....	.....	4,500	1½
Cape May	75	35	2 00	75	35	2 50	80	200	50	125	4,000	1
Cumberland	92	50	1 92	97	30	1 62	75	100	75	50	.....	2½
Essex	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gloucester	80	40	2 40	75	30	1 50	75	100	75	50	.....	2½
Hunterdon	25	.....	2 00	.....	.....	.....	.....	500	15	.....	.....	.....
Mercer	42	30	1 94	70	50	1 45	125	300	30	.....	.....	.....
Middlesex	50	.....	1 75	.....	.....	.....	.....	.....	.....	.....	.....	.....
Monmouth	.....	30	1 50	.....	50	1 50	.....	200	25	.....	.....	1¼
Morris	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ocean	70	20	75	100	80	75	110	200	40	.....	.....	.....
Salem	105	60	1 42	120	30	1 75	65	.....	.....	.....	.....	.....
Somerset	56	.....	1 32	70	.....	1 13	142	.....	26	105	.....	2
Sussex	10	10	2 00	100	30	1 75	120	500	40	50	.....	.....
Union	100	40	3 00	25	15	2 25	120	250	25	100	.....	.....
Warren	10	.....	2 00	60	.....	2 50	100	.....	20	80	.....	1½
Average for State	48	.....	.....	70	.....	.....	75	.....	.....	74	.....	.....

From preliminary report of U. S. Department of Agriculture. Per cent. compared with a full crop.

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.	Product compared with last year—per cent.	Average yield per acre—quarts.	Average price.	Product compared with last year—per cent.	Average yield per acre—quarts.	Average price.	Product compared with last year.	Average yield per acre—hundreds.	Average price.
Atlantic	180	1,800	$0 06	85	980	$0 11	65	1,140	$0 06½	75	675	$7 00
Bergen												
Burlington	100	4,000	09	100		15	50		12	60	800	7 00
Camden		3,896	07		3,546	09		957	04 7/10			
Cape May	100	2,500	05	90	400	09	100	2,000	07	75	2,500	7 00
Cumberland												
Essex												
Gloucester	100		07	80		08	80		05	75	1,050	
Hunterdon												
Mercer	100	2,600	05⅔	100	1,200	10	100	2,000	09			
Middlesex	100		06									
Monmouth	100	1,200	02	100	1,000	10	100	1,500	06			
Morris												
Ocean	50	2,000	10	75	1,200	08	25	1,000	07			
Salem	100									100	2,000	9 00
Somerset	105		06⅔	93		08	108		06⅔			
Sussex	110	2,000	10	60		09	150		06			
Union	100	1,500	07							75	2,500	
Warren	50		08	100		07	100		07	25	500	10 00

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

COUNTIES.	CITRON MELONS.			CUCUMBERS.			CABBAGES.			TOMATOES.		
	Product compared with last year—per cent.	Average yield per acre.	Average price per basket.	Product compared with last year—per cent.	Average yield per acre.	Average price per basket.	Product compared with last year—per cent.	Average yield per acre.	Average price.	Product compared with last year—per cent.	Average yield per acre—tons.	Average price per basket.
Atlantic	100	400	$0 40				115	2,750	$0 03	75	2½	$0 30
Bergen												
Burlington	80	400	30	25			55	4,000	3 00	50	7	40
Camden		300	30		450	$0 25		2,500	2 50		6	35
Cape May	80	400	25				50	2,000	3 00	60	4	25
Cumberland												
Essex												
Gloucester	80	200	30	100	250	30	80	300	3 00	90	4	25
Hunterdon							60			40		25
Mercer												
Middlesex												
Monmouth									3 50			
Morris												
Ocean							100	3,000	2 50			
Salem	95		25				100		3 00	60	5½	
Somerset												
Sussex												
Union							50	1,100	2 50	40	3	40
Warren	25			40			100		3 00	25		75

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

COUNTIES.	HORSES.		MULES.		COWS	
	Total number compared with December 1st, 1896—per cent.	Average price between 3 and 7 years old.	Total number compared with December 1st, 1896—per cent.	Average price between 3 and 7 years old.	Total number compared with December 1st, 1896—per cent.	Average price between 3 and 7 years old.
Atlantic	100	$65 00	100	$70 00	100	$35 00
Bergen						
Burlington	100	100 00	91	125 00	102	40 00
Camden						
Cape May	100	60 00	100	75 00	100	27 50
Cumberland	100	67 50	100	68 75	105	45 00
Essex						
Gloucester	100	60 00	100	75 00	110	45 00
Hunterdon	100	80 00	100		105	40 00
Mercer	100	81 50	98	95 00	104	37 50
Middlesex	100	90 00	100	100 00	110	40 00
Monmouth	100	55 00	100	60 00	100	30 00
Morris						
Ocean	105	75 00	100	65 00	98	30 00
Salem	100	55 00	100	62 50	101	45 00
Somerset	100	75 00	95	95 00	109	39 00
Sussex	100	75 00			100	35 00
Union	100	60 00			100	45 00
Warren	100	50 00			105	40 00

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, 1896—per cent.	Average price per pound for season—cents.	Total number compared with December 1st, 1896—per cent.	Average price per head for store sheep.	Total number compared with December 1st, 1896—per cent.	Average price per head for spring lambs.	Total number compared with December 1st, 1896—per cent.	Average price per pound December—cents.	Total number compared with December 1st, 1896—per cent.	Average price per pound November and December—cents.	Total number compared with December 1st, 1896—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	$0 06	.....	.....	.....	.....	100	$0 06	100	14	100	10	100	100	100	100
Bergen	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Burlington	95	05	95	$3 50	90	$4 00	100	04½	70	15	95	12	115	85	90	85
Camden	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cape May	.....	.....	.....	.....	.....	.....	90	06	110	13	110	12	.....	.....	.....	.....
Cumberland	95	04⅜	102	4 00	.....	.....	.....	.....	85	15½	100	13	107	95	80	70
Essex	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gloucester	90	04½	90	4 00	90	4 50	90	05	75	16	100	13	100	90	80	70
Hunterdon	.....	05	.....	.....	.....	.....	100	04	75	12	105	08	110	100	100	100
Mercer	102	04½	97	3 75	.....	.....	100	04½	80	14	100	10	109	94	95	94
Middlesex	.....	.....	.....	.....	.....	.....	100	05	75	16	100	10	110	90	90	90
Monmouth	110	05½	100	3 00	100	4 00	100	04½	100	12	100	10	100	100	100	100
Morris	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ocean	.....	06	.....	.....	.....	.....	80	06	80	12	80	10	75	90	150	100
Salem	100	05¼	115	4 00	.....	.....	95	05½	95	15	100	13	115	100	.....	.....
Somerset	106	05½	72	3 83	82	4 33	100	05	88	14	100	10	107	95	97	96
Sussex	100	05	100	.....	100	.....	100	05½	90	11½	100	09	100	100	100	100
Union	100	05	.....	.....	.....	.....	100	05	.....	.....	100	10	90	75	90	75
Warren	.....	05	.....	4 00	.....	4 00	.....	05	.....	12	.....	08	.....	100	40	100

REPORTS OF COUNTY BOARDS OF AGRICULTURE.

ATLANTIC COUNTY.

OFFICERS FOR THE YEAR 1898.

President	PHILIP BERGMANN	Egg Harbor City.
Vice President	P. H. BROWN	Hammonton.
Secretary	VALENTINE P. HOFMANN	Egg Harbor City.
Treasurer	FREDERICK FIEDLER	Egg Harbor City.

DELEGATES TO STATE BOARD.

V. P. HOFMANN (one year)	Egg Harbor City.
L. H. PARKHURST (two years)	Hammonton.

BOARD OF DIRECTORS.

EDWIN ADAMS, Hammonton Fruit Growers' Union.
G. W. LYSINGER, Hammonton Fruit Growers' Association.
CHARLES KRAUS, Atlantic County Agricultural and Horticultural Association, Egg Harbor City
GEORGE HANSELMANN, Germania Fruit Growers' Union, P. O. Cologne, N. J.
L. H. PARKHURST, Director-at-Large, Hammonton, N. J.

REPORT.

BY V. P. HOFMANN.

There were two meetings held during the past year, both combined with Farmers' Institutes. The one held December 16th, 1896, at Germania, was intended to extend the scope of the annual meetings in a new direction, but unfortunately did not meet with the anticipated success, as a blizzard set in the previous night, in consequence of which the speakers and officers had difficulty to reach the distant hall from the railroad station. Nevertheless, those attending were well rewarded by listening to the able address of Mr. J. A. Kelsey, upon "Weeds, Their Effect on Crops, Soil and Moisture," and of Mr. A. T. Jordan, on "The Cultivation of the Soil in Its Relations to Fruit-Growing."

The last annual meeting was held at Hammonton, N. J., on November 22d, 1897, which was so far the best-attended meeting ever held by the Board. The following subjects were ably discussed by the respective speakers, and many interesting questions put and elucidated: "Raspberries, Best Varieties and How to Grow Them," by L. H. Parkhurst, of Hammonton, N. J.

"Intensive Culture and Its Results," by W. F. Bassett, of Hammonton, N. J.

"Sweet Potato Culture," by William Colwell, of Hammonton, N. J.

"How to Grow Good Crops in Dry Seasons" and "The Wife's Share in the Farm," by T. B. Terry, of Ohio.

"Strawberry-Growing in Hills or Matted Rows; Which is Most Profitable?" by T. C. Kevitt, of Passaic county, N. J.

"Marketing Farm Products," by F. H. Valentine.

"Irrigation of Farm Crops in Southern New Jersey; Is It Practical?" by George A. Mitchell, of Vineland, N. J.

The meeting was conducted by Secretary Franklin Dye.

GENERAL REMARKS.

The season of 1897 was favorable for all crops with but few exceptions.

The rainfall set in very early and continued with but slight intermissions until toward fall, when a short period of drought followed.

Farm products showed a higher percentage in yield; fair prices were realized for all products of the field, garden and orchard, and in consequence the farmers are well contented with this year's results.

The following crops show increased percentages compared with those of 1896: Hay, 15; apples, 25; pears, 85; peaches, 70; strawberries, 70; citrons, 50; cabbages, 22.

The following show decreased percentages: Corn, 11; oats, 18; white potatoes, 1; sweet potatoes, 40; grapes, 15; raspberries, 15; blackberries, 75; watermelons, 15; tomatoes, 50.

Increased prices may be rated on the following: Corn, 10 cents per bushel; wheat, 33; rye, 7; oats, 8; buckwheat, 15; white potatoes, per barrel, $1.10; sweet potatoes, 95 cents; apples, $1.75; pears, 10; raspberries and blackberries, 2 cents per quart; watermelons, $2 per hundred; tomatoes, 5 cents per basket.

The early and continuous rainfall, combined with great humidity, proved very disastrous to the grape crop. The advocates of oft-repeated sprayings with fungicides were no more fortunate in arresting the ravages of the grape-rot and saving their harvest than those who neglected to apply remedies. All the known remedies proved unavailing. The study of the peculiarities of soil, location and climatology may be helpful in elucidating why certain localities are immune from the attacks of this disease. It is a noteworthy fact that a small locality of about one square mile in extent, in Mullica township, bore bounteous crops of grapes, whilst on the adjoining and all other parts of the county the percentages ranged from 5 to 30 per cent. of a full crop. The grape-leaf worm, noted in last year's report, was less alarming in its work, as people were forewarned and more careful in destroying the eggs and first-appearing worms.

In connection with the above one correspondent makes the following pointed remarks: "Among the discouragements farmers have to contend with, and which causes no little alarm, is the notable increase of all injurious insects, in spite of the large quantities of insecticides which are annually used. This is largely due to the gradual decrease (in some cases almost extinction) of our songbirds. It is a lamentable fact that our woodland songsters, which, aside from their economic value to farmers, add so much to the attractions of rural life, are annually slaughtered in large numbers, especially for millinery purposes. I hope the lawmakers of our own State will follow the example of those from other States, and pass laws to put a stop to this nefarious trade."

Farm animals have been more healthy; but few cases of fatal diseases came to my knowledge.

The first new road constructed under the Good Roads law has been completed and in use for nearly a year. It has demonstrated its value and capabilities, and will be the means of extending this system of roads to other parts of the county, which are in great need thereof. The construction of a branch road connecting the county seat with the road at Egg Harbor City will be before long an assured fact, and I trust that future reports may chronicle these necessary extensions.

BERGEN COUNTY.

OFFICERS FOR 1898.

President	H. W. Collingwood	Hackensack.
Vice President	A. C. Holdrum	Westwood.
Secretary	M. H. Angell	Etna.
Treasurer	D. J. Demarest	Oradell.

BOARD OF DIRECTORS.

Samuel R. Demarest, Jr.	Hackensack.
Martin J. Myers	Woodcliff.
John Heck	Westwood.
John C. Van Saun	Maywood.
John H. Ackerman	Englewood.
Albert J. Bogert	River Edge.
David A. Pell	Saddle River.
John H. Riley	Hillsdale.

REPORT.

BY THE SECRETARY.

This Board has held three meetings during 1897, at each of which a good degree of interest was manifested. To the thoughtful observer it is apparent that much good has been accomplished in the county in agricultural matters since the date of our organization in February, 1895.

Whether this intelligent interest in agriculture is due principally to the influence of the meetings of the members of the Board, or to the Farmers' Institutes, under the auspices of the State Board, which have now been held in our county for three consecutive winters, is difficult of determination.

It is certain that the Farmers' Institutes have provoked a higher and more intelligent examination into agricultural matters than ever

was the case before by such of the farming population as have attended the meetings. We feel that the attendance at these Institutes should be greatly increased, and members of our Board propose making special efforts during the year upon which we are about entering to awaken increased interest in them.

The location of the county being so near to the cities of Paterson, Newark, Jersey City and New York, is an inducement for farmers to engage in raising such things as the near-by markets demand; and hence early potatoes, sweet corn, lima beans, squashes and cabbages, with an increasing quantity of strawberries and some other small fruits. It is gratifying to be able to add that the season of 1897 was fairly well adapted to the production of these things, and that the prices obtained were generally very satisfactory.

Some of our farmers who were unable to pay all expenses during 1895 and 1896, have during 1897 paid the debts of former years and have something left "to the good." An interesting feature in strawberry culture was accidentally disclosed on the farm of an intelligent member of the Board this fall. This farmer raised about 7,000 quarts of berries during the season, and early in October his son, while showing the strawberry patch to a visitor, made the discovery that there were then ripe, luscious berries on the vines. After picking a few quarts for use at supper, they picked the next day more than three full crates of fine berries for market.

Mr. H. W. Collingwood, editor of the "Rural New Yorker" and President of this Board is conducting a series of experiments at Hope farm near Westwood, relative to increasing at minimum cost the fertility of the soil, from which good results are expected and which are watched eagerly by our farmers.

BURLINGTON COUNTY.

OFFICERS FOR 1898.

President..... CHARLES LIPPINCOTT..... .....Moorestown.
Vice President.....GEORGE W. JESSUP.....Cinnaminson.
Secretary and Treasurer.....HENRY I. BUDD.....Mount Holly.

DIRECTORS.

EMMOR ROBERTS, Burlington County Agricultural Society, P. O., Fellowship.
JOHN E. DARNELL, Mount Laurel Farmers' Club, P. O , Mount Laurel.
B. F. BISHOP, Coopertown Farmers' Club, P. O., Rancocas.
EDMUND BRADDOCK, Medford Grange, P. O., Medford.
FRANK ZELLEY, Columbus Grange, P. O., Jacksonville.
JOSEPH HENDRICKSON, Crosswicks Grange, P. O., Crosswicks.
GEORGE W. LUNDY, Pemberton Grange, P. O , Mount Holly.
MARK HAINES, Rancocas Grange, P. O., Mount Holly.
CLAYTON ANDREWS, Moorestown Grange, P. O., Moorestown.
NATHAN S. WEIGHT, Edgewood Grange, P. O., Burlington.
THOMAS J. BEANS, Director-at-Large, P. O., Moorestown.

THOMAS J. BEANS (two years), delegate to State Board of Agriculture.

Our annual meeting was held on Saturday, December 11th, 1897. There was a very large attendance, the Court House being crowded to overflowing. There was much interest manifested in all of the following subjects, each paper on presentation eliciting many questions and much discussion :

"Poultry From Farmer's Standpoint; What It is and What It Should be," George L. Gillingham, Moorestown.

"Marketing Farm Crops," Hon. D. D. Denise, President State Board of Agriculture, Freehold.

"Making and Using of Farm Manures," Prof. Edward B. Voorhees, Director of New Jersey Agricultural Experiment Station.

"Sugar Beets and Beet Sugar," Dr. Stockton Hough, Trenton.

"My Experience in the Use of Commercial Fertilizers," George W. Jessup, Cinnaminson.

"What Legislation, if Any, Do Farmers and the Public Generally Need Concerning the Production and Purity of Their Milk?" Hon. George Wildes, New Egypt, and Hon. George W. McGuire, State Dairy Commissioner.

"Broad Tires; Their Effect on the Roads, and How to Bring Them Into General Use," J. J. Albertson, Magnolia, N. J.

REPORT.

BY THE SECRETARY.

For the year ending December, 1897, the pecuniary condition of certain kinds of farming has materially improved. Certain crops have brought better prices, and those having large yields of these have tasted some of the sweets of prosperity. Better average prices have been realized than for many years, but these have been mostly the result of scarcity and the short crops of other producing countries. Because of the large foreign demand for wheat, sales have ranged around the dollar-mark per bushel, which has brought more money to the farming districts than when it sold for 60 cents. The season has been a checkered one, favorable to the growth of hay and grain crops but unfavorable to all kinds of vine crops on account of excessive rains in the flowering stage of these plants.

Wheat has been a most excellent crop, yields ranging all the way from 20 to 40 bushels to the acre. Five to 10 per cent. of it was exposed to the storm and badly damaged.

Rye has also been an extraordinary yield, ranging all the way from 15 to 30 bushels per acre. Five to 10 per cent. of it was exposed to the storm and badly damaged.

Hay has been unusually productive. The early rains, during its most vital season, caused a yield of from 2 to 4 tons per acre; then came an intervening space of dry weather, which allowed the most of it to be gathered without damage, but the later gathering was very much hurt by rain. About 20 per cent. of it was caught by the eighteen days of rain in July, and fully 50 per cent. of the amount exposed lost. The price is very low, selling from $8 to $12 per ton.

Oats were almost a failure; the hot sun prevented the heading of the grains, and the heavy rains at harvest time prevented the gathering, rotted the straw and beat off the few heads that remained, so that in most instances they were scarcely worth threshing.

Corn yielded about 75 per cent. of a crop, our most certain soils producing the poorest on account of the extreme moisture in the early season flooding the heavy lands, causing disease of the roots, which prevented the plants from getting a healthy start; then a warm, dry period came, which developed its growth on high lands very rapidly, but the excessive rains in the latter part of July so flooded the low-lying fields they could not be farmed; the result was they did not receive their last plowing; as a consequence were overrun with weeds. On loamy soil, well drained, we hear of yields ranging from 60 to 90 bushels per acre. On lower lands 30 bushels, with much imperfect corn, is the rule. The weather has been favorable for gathering in good condition. Hail and wind did much damage to the corn in some sections.

Pasture.—The young grass after grain, and the pasture after mowing, has also had an unusually fine growth, and much ground has been cut over the second time where there was a deficiency in stock to gnaw it down. The later drought and heat of October checked the growth of the grass and destroyed the pasturage.

Seeding was very late this season on account of almost two months of dry weather, which so baked the ground that farmers were prevented from sowing a large part of their ground until the first week in November. The later rains and prolonged mild weather have developed it quite rapidly, and it presents now a very fair top. Where circumstances were favorable for early sowing, the top is very large, fine and promising. On account of the improved prices, farmers aimed to make a large sowing and continued their seeding up to the middle of November.

Milk.—For the past week milk, on account of the great scarcity, has been selling at 3½ to 4 cents per quart. It has been a discouraging year for the majority of the milk producers; the price has ranged from 2 to 3½ cents, most of the season selling for 2 cents clear of freight. Much of it, besides, did not find a market, the dealers requiring the farmers to keep it at home. This result is partly caused by overproduction and partly by the collapse of the Milk Dealers' Association, which leaves the farmers at the mercy of the

milk dealers, who now name the price they will give. With the present range of prices, very many farmers had better be out of the business. The careless manner in which they conduct it precludes any chance for profits at the average prices prevailing.

Apples have been a very poor average crop. A few orchards have been loaded with early apples; many orchards entirely bare. Those that were fortunate in obtaining fruit have received profitable prices ranging from $1.50 to $2 per barrel; the price at present writing is $3 per barrel.

Pears.—Keiffer is about the only variety that has produced quantities to make them worthy of notice; on some orchards an unusual yield, on most only half a crop. They have sold from $1 to $2.50 per barrel. On account of the absence of other varieties, the Keiffer is the sole occupant of the fruit stands, which is an unusual condition in the history of pears. There have been large shipments from our county to many points in the United States. It seems to have grown in popular favor as an eating pear. Specimens grown on sandy soils seem to possess all the virtues of the best of pears—juicy, tender and an absence of coarse grain, such as is largely found in this variety. Those fortunate enough to have full crops have certainly been favored. One grower is said to have raised and shipped 65,000 baskets, the largest yield ever credited to any orchard; another, 25,000 baskets, and many from 2,000 to 5,000.

Peaches have been a full crop in most all orchards. The yield of some trees was simply enormous, the fruit breaking down and injuring the trees. The quality has been poor, mostly bitter in taste, the result of prematuring. The size has been small on account of overbearing, and this seems to have been the rule over the whole State. The result has been the price was small, largely on account of oversupply, bitterness and deficiency in size. Growers should learn a lesson from this year's experience and severely prune or thin their fruit.

Grapes started out with a fair crop, but the rot so speedily overtook them they proved a complete failure; but the New York grape crop was so large it has more than filled all the voids in our market at a price that would, under the most favorable conditions, bankrupt our growers.

Cranberries about half a crop; they are just beginning to take the

market, as the dealers have been holding them for larger prices. They are quoted at from $2 to $3 per crate.

Cherries were a moderate crop; prices realized very fair. Large number of trees being set out.

Plums.—Much attention has been given to the setting out of plum trees. Our markets will, in the future, receive some large accessions of this kind of fruit from home growers, but the immense crop in New York State, and the consequently low price of one cent a quart, is not very encouraging for new orchard-planting.

Melons.—The melon crop has been almost a failure. The storms destroyed the early blossoms and set the fruit back so many weeks, that when it did come to perfection there was so much other more seasonable fruit in the market that melons brought a sorry price. Watermelons—a very poor crop and prices low. Cantaloupes—a moderate crop and prices fair; quality not extra. Heavy rains and hot sunshine injured the melon vines.

Tomatoes have averaged about one-third of a crop. The early plants seemed to have many enemies and required frequent settings. The heavy rains destroyed the first blossoms, so it was not until late in the season that fruit was produced. The result was that the very early forced tomatoes brought profitable returns to their growers, the later field crops not coming in competition with them. There has been a great demand from the packers, they not being able to obtain one-half of their needed supply. The prices in the city markets were quite remunerative, as the supply was far below the demand.

Pickles.—The pickle crop had the usual fortune of other vine crops, being destroyed by the heavy rains, and the pickling establishments had to go begging for their supply.

Asparagus—The yield has been below the average, causing a short supply for the canners. The rust has attacked all the beds and much diminished their vitality. This condition has made it very easy to dispose of this product, even if the quality has not been up to the standard.

Cabbage has been a fairly remunerative crop. There has been sufficient moisture to properly head and grow. They are finding a quick market at from $3 to $4 per hundred.

Sweet Potatoes—The sweet potato crop was very good and of very superior quality. The demand for them has been constant at advancing prices. They are now quoted from $2.50 to $3.50 per barrel.

White Potatoes.—The crop of white potatoeswas exceedingly light, not only here but nearly all cver the United States, not being more than 40 per cent. of a crop. Excessive rains, lice and fungi destroyed the vines and prevented a healthy growth of the tuber. There have been some few large yields recorded of from 200 to 300 baskets per acre, but the majority of fields yielded from 50 to 75 baskets per acre. Potato rot has prevailed to some extent in low ground.

Pork.—There is only a moderate crop in our county compared with former years. The farmers instead of having large crops of late pork as they formerly did, now only raise a few early pigs, which are now finding a market at from 4 to 4½ cents per pound. The hog cholera prevails in some sections, which causes our farmers to be very careful about increasing the size of their herds.

Poultry.—There is a great scarcity of turkeys; the cold rains of the early season destroyed the early hatches; other kinds are about up to the usual standard. It sells from 12 to 15 cents per pound.

Blackberries, Raspberries and Strawberries were moderate crops and brought satisfactory prices. We had some few examples of very large and profitable yields of strawberries.

Insects.—There has been no deficiency in the crop of insects and diseases to which fruit trees and vines have been subjected; blight has played sad havoc with many orchards of pears. The San José scale has come as a new enemy to our fruit trees. The whole country seems to be in danger from its ravages; from present appearances, nothing but the most radical measures will save our orchards. The most effective remedy that has been practiced is spraying the trees with pure kerosene oil. It would seem that all fruit-growers who are not willing to frequently spray had better retire from the business, for the enemies of the fruit constantly increasing will claim the whole product if they are not destroyed by unusual vigilance. Prof. Rolfs, of the Florida Experiment Station, claims that there is a fungus which attacks the San José scale, and that large quantities of the fungus may be propagated in the laboratory at a small expense. It may then be distributed to fruit-growers, who can apply it wherever required. If this proves true it will be but a few years before the scale can be exterminated, spraying being unnecessary.

The ravages of lice upon our vine crops have not been so great as last year, potatoes being about the only ones subject to their depredations; the heavy rains protected the melons and kindred crops, but

upon shade trees they have been unusually prolific; tender shrubs have had their leaves so affected with the lice that they frequently lost their foliage by the leaves curling and falling. Norway maples have been a favorable field for their operations; the extreme vitality of this species of trees has only protected them, for the lice have bled the sap almost as freely as the butcher's knife in the slaughter of the animal. The soil underlying the trees kept moist all the season with the exudations of the lice or aphis.

The low and constantly-decreasing price per acre of farm lands in the Eastern States does not come, as many suppose, from a gold standard or causes other than those which the wealth and energy of the nation are constantly setting in motion, as the rapid development of our immense Western areas and cheap transportation of their products. This will be shown from some of the following statistics:

"Up to 1890 we had brought under cultivation 4,564,000 farms, containing upward of 623,000,000 acres. From 1850 to 1890 the area of our farms was increased by 245,000,000 acres, an average of 16,000 acres per day. The new farms occupied and improved during these forty years are greater in area than the German Empire, England, Scotland, Ireland, Holland, Denmark, Belgium and Switzerland collectively; then to transport the products of these farms in 1830 we had twenty-three miles of railway. Averaging the construction for the sixty-five years following, we built every year enough to cross the continent—3,000 miles from ocean to ocean—at the average annual cost of $149,000,000. During the last twenty years of this period we expended on new lines $1,000,000 a day. What a comment on our industrial and commercial activity, that the 70,000,000 people of the United States transport by rail twice as much merchandise as the remaining 1,400,000,000 of mankind! In 1895 we had 802,000 miles of telegraph wire, enough to encircle the earth thirty-two times, or to cross the continent 267 times.

"The energy or working power of the nation, including hand, horse and steam power, is more than twice as great as that of Great Britain, and is nearly equal to that of Great Britain, Germany and France combined.

"With this power directed chiefly to the creation of wealth, it is not strange that we are growing rich more rapidly than any other people. Our wealth in 1820 was less than $2,000,000,000. In twenty years it had doubled, and in forty years it had increased eightfold. During

the thirty years following, from 1860 to 1890, we created and accumulated $49,000,000,000, a thousand million dollars more than the entire wealth of Great Britain; and notwithstanding the great increase of population our wealth per capita doubled during this interval. The wealth of the Old World is the accumulation of many centuries, but ninety-four per cent. of ours has been created and accumulated since 1840; and we are now increasing it at the rate of $7,000,000 a day. Surely 'these American days are more marvelous than the Arabian nights!'"

The increase of material wealth has been simply prodigious. It is not intemperate to say that there has been more material progress during the nineteenth century than during the entire preceding history of the race, and yet the Eastern farmer is becoming poorer, because rapid development along his lines has made a supply greater than the demand, hence continued unprofitable prices for staples.

Hon. H. J. Irick writes that "about the 25th of July we had a heavy wind shower, a regular tornado, accompanied with much hail, which flattened the corn and potatoes, making them look, in the southerly section of our township, as if they had been rolled. The storm was about a quarter of a mile wide, running three-quarters of a mile at right angles nearly due east across my farms, and in this belt corn will not average 20 bushels per acre. This township is in the marl belt and marl makes corn and grass, but the excessive rains and cold August put our average corn crop 10 bushels below the average.

"Apples and oats came near being an entire failure. The wheat crop is fair—beyond the average. I am confident I will have over 30 bushels per acre, half as much again as I ordinarily have, and of the very best quality. I know of no epidemic diseases in any kind of stock, but farmers in the adjoining township of Shamong are having some kind of hog plague, losing all lots attacked."

Thomas J. Beans writes that the wheat condition is marked below 100, caused by backwardness—was so late.

Wheat caught in shock by harvest storms sold at 70 cents per bushel.

Apple crop very moderate, some orchards scarcely any. All fruit somewhat susceptible to injury from insects and fungi, perhaps spring freezing reduced vitality and lessened vigor to resist.

In this township public threshers say 30 bushels per acre is the common find for wheat and running up to 40 bushels. There were many light crops of potatoes; one farmer has estimated at 12,000 baskets from 35 acres.

Joel Wainwright, Hanover township, writes: "We have had somewhat of hog cholera in the eastern part or side of township, but as to cause no one seems to know. The milk industry seems to be overdone, and if about 25 per cent. should drop out of the business the other 75 per cent. might make it pay."

CLIMATIC HISTORY OF BURLINGTON COUNTY, N. J., FOR YEAR 1897.

Lat., 40°; Long., 74° 54′; elevation above tide, 71 feet.

	TEMPERATURE.			Rain and melted snow—inches.	Snow—inches.	Temperature compared with 34 years—normal.	Rainfall compared with 34 years—normal.	Number of days on which 0.01 inch or more of rain fell.	Cloudy—number of days.
	Maximum—degrees.	Minimum—degrees	Mean—degrees.						
January	61	6	30.1	1.97	10.75	.....	.....	9	13
February	55	10	33 8	3.58	6	.....	.....	9	16
March	68	18	42.3	2.75	Trace	.....	.....	12	17
April	84	26	51.7	4	.....	.....	.....	12	12
May	84	40	61.4	5 38	.....	.....	.....	13	14
June	91	43	66.8	4.58	.....	.....	.....	12	12
July	95	61	76.1	11.35	.....	.....	.....	16	18
August	89	53	71.8	3.12	.....	.....	.....	8	8
September	95	40	66.6	1.42	.....	.....	.....	4	7
October	90	30	57	2.60	.....	.....	.....	8	13
November	72	19	44.9	4.64	.....	.....	.....	13	18
December	67	12	36 2	4.95	0.25	.....	.....	10	21
Year	95	6	53.2	50.34	17	.....	.....	126	.....

The latest deadly frost in spring was on April 26th (35°); the earliest in autumn, October 18th (32°), making length of season for out-of-door growth of tender vegetation, 175 days. The year began with water-supply in wells and springs low beyond our record, the rainfall for years 1895 and 1896 being 14 inches less than average. The rains of February lifted springs somewhat, but not until the heavy rains from April to July, were they filled to normal condition.

The rainfall of July, 11.35 inches, was the heaviest monthly rainfall during record since May, 1863, save those of September, 1882, with 11.71 inches, and of May, 1894, with 12.88 inches. On sandy land with sandy subsoil, this heavy downpour, passing through, carried with it the soluble plant-food below the feeding-roots of corn, and made the yield very light. Some peach orchards were very much benefited by it, and the subsequent favorable conditions in August and especially September, caused unexpected development of size and good quality in later varieties of peaches. The freeze of April 21st, 26° in shelter from radiation, when some fruit trees were in open blossom, revealed unsuspected power of resistance in fruit blossoms. That it gave shock to vitality so that the fruit yielded the more helplessly to deleterious influences, may account for so much faulty and decaying fruit in our orchards. In autumn a dry period caused some soils to so harden that wheat could not be sowed as early as desired. The year closes with better water-supply in wells and springs than for several years.

CAMDEN COUNTY.

OFFICERS FOR 1898.

President	HOWARD H. BELL	Mount Ephraim.
Vice President	CHARLES C. STEVENSON	Blackwood.
Secretary	RODOLFUS BINGHAM	Camden.
Treasurer	EZRA C. BELL	Haddonfield.

BOARD OF DIRECTORS.

ELWOOD EVANS	Haddonfield.
R. LEVIS SHIVERS	Camden.
AMOS EBERT	Ashland.
R. COOPER MORGAN	Blackwood.
EDWARD W. HUNT	Kirkwood.
JOHN MCCULLOUGH	Blackwood.

DELEGATE TO STATE BOARD.

R. LEVIS SHIVERS (two years)	Camden.

REPORT.

BY THE SECRETARY.

A Farmers' Institute meeting of three sessions was held in Haddonfield Opera House on November 17th. It was well attended and the different topics were ably discussed. The farmers manifested much interest and were no doubt profited by it.

The annual meeting of the County Board was held at Blackwood, November 29th.

Memorial resolutions were adopted in respect of the late President, Isaac W. Nicholson.

The different topics were discussed and more than the usual interest was manifested. In accordance with your suggestion, a motion was carried to hold a meeting on the last Tuesday in February.

Apples and Pears ripened earlier than usual, and winter varieties rotted badly—earlier than heretofore.

Strawberries.—Strawberry plants made an unusual growth, which was no doubt caused by the excess of temperature—about 300°—and several inches excess of rain from July 10th to August 10th. We now, December 14th, have ripe strawberries and blossoms in the field by covering them with glass on frosty nights. They are of the Gandy variety, which we never knew to bloom in autumn before. There was quite a picking of some varieties in September and October.

Raspberries were also picked for second crop. If, as we suggest, the second crop was due to excess of temperature and moisture, may not those conditions be supplied with glass and irrigation in ordinary seasons?

Huckleberries.—In improving a swamp we selected the best of several varieties of swamp huckleberries for cultivation, and picked eight quarts from one bush occupying thirty-six square feet, which is equal to 9,680 quarts per acre and a product of $580.80.

Pink Pond Lilies yielded at the rate of 12,147 flowers per acre. Average wholesale price, $4 per hundred and $485.88 per acre.

Violets and Dahlias.—We have a large violet-grower, and we presume the prince of dahlia gardeners, with thirty-six acres and 1,000 varieties.

REPORT OF CROPS IN CAMDEN COUNTY FOR 1897.

	Per Acre.	Price.		Amount.
Corn, stock.....(bushels)	50	$0 40		$20 00
Wheat.....(bushels)	27	93		25 11
Rye.....(bushels)	18	45		8 10
Oats..... ....(bushels)	30	27		8 10
Hay.....(tons)	1.5	10 00		*15 00
Asparagus.....(bunches)	997	09		89 73
Potatoes, white.....(baskets)	300	32	= $96 00. Corn $99 00	195 00
Potatoes, sweet.....(baskets)	300	32		96 00

* Average of five crops, $15.26.

	Per Acre.	Price.	Amount.
Corn, table.....(baskets)	225	$0 44 = $99 00. Peas $19 50	$118 50
Pears.....(baskets)	866	30	259 80
Squashes.....(baskets)	500	20	100 00
Muskmelons.....(baskets)	300	30	90 00
Tomatoes.....(baskets)	250	27 = $67 50 + $19 50	87 00
Cucumbers.....(baskets)	450	25 = 112 50 + 19 50 + $99	231 00
Peas.....(baskets)	60	35 = 19 50 + 99 00	118 50
Beans, string.....(baskets)	200	35	70 00
Beans, Lima.....(bushels)	336	46	154 56
Strawberries.....(quarts)	3,896	07	212 72
Blackberries.....(quarts)	957	047	44 98
Raspberries.....(quarts)	3,546	09	319 14
Huckleberries.....(quarts)	9,644	06	578 64
Grapes.....(pounds)	4,500	015	67 50
Cabbage.....(hundreds)	2,500	2 50 = $67 50 + $99 00	161 50
Watermelons.....		1 50 Not marketed.*	
Water-lily flowers.....	12,194	04	485 88
Average of five farm crops, 1896.....			11 19
Average of eleven garden crops, 1896.....			71 72
Same eleven crops, 1897.....			113 04

* Average of nineteen crops, $157.60.

Increase in value of farm crops, 36 per cent., and garden crops, 57 per cent. Have not been able to get cost of growing and marketing crops, but would estimate the cost, including rent of land and manure, about $10 per acre, and labor, $8; total, $18 for farm crops; and rent, $5; manure, $25; labor, $20; total, $50 per acre on each acre for garden crops. This gives us a loss of $2.74 per acre on farm-crop land, and a gain of $107.60 on garden land, or an average on the two past years on garden land of $64.66 net profit per acre. Such reports, if accurate or nearly so, would be of great value to farmers and market-gardeners in determining what crops to grow.

We observed and stated ten years ago that it did not pay to grow farm crops on garden land, and the change has been going on until now there is probably more stock corn and wheat as flour bought than sold in our county. It is hardly probable that there will be an overproduction in all the garden crops for some time to come, and as such time approaches we would suggest that a portion of the land be used for growing plant-food, and thus reduce the amount paid out and diminish the acreage for crops and secure better prices for all produce sold.

The huckleberries were calculated from one plant from which we picked 8 quarts. It is a bush left when clearing up a swamp, and we gave it 36 square feet. It shows the possibility of many waste wet places in our county.

The lilies are grown in the pools made in draining the same swamp, and blackberries, raspberries, strawberries, lettuce, grass and forest trees are grown on portions of the improved ground. We would not say that all the water surfaces in the county would yield as much per acre in water-lily flowers, for two growers now supply Philadelphia and Atlantic City with all required at present prices, and some have been sent as far south as Virginia and west to Chicago. We have a large violet-grower, and probably the largest dahlia-grower in the country at Atco, with 26 acres and 1,000 varieties.

Strawberries have been the best-paying crop during the past several years, and the acreage has been increasing, and will no doubt continue to increase until the supply exceeds the demand. But fine fruit will bring a paying price when common to poor will not sell. We therefore advise the hill system, with good culture and irrigation, where practicable. We have sold fine Gandy berries at 16 and 18 cents per quart when smaller varieties brought 10 to 12 cents. A neighbor sold his Gandys one year at an average of 18 cents, and his other variety for 6 cents. We learn that the Southern planters are adopting the hill sytem for strawberries and hills or drills for kale, spinach, &c., and will send into our market by cold cars their fruits and vegetables in quality and condition to equal or surpass ours, unless we keep to the front of improvement.

This season, when the Ironclad class of watermelons brought only $1 and $2 per hundred and did not pay for marketing, one grower obtained $5 to $10 for Icelands, a better variety.

A few years ago the writer grew a crop of Jersey Mountain Sweets, and after all of market size were picked, dealers insisted on having the very small ones.

In answer to "What shall farmers do to better their condition?" we would say study and try to solve some of the great problems presented in agriculture. Avail ourselves of the services offered by the experiment station, the institute and other meetings, of the agricultural papers, and experiment with check rows on varieties, modes of culture and plant-foods, and keep debtor and creditor accounts

with all crops. There is no better business school for our boys and girls. We would suggest to the annual meeting of our State Board of Agriculture and State Horticultural Society that they take some action in reference to the next national census, that the change rapidly taking place from cereal farming to fruit and vegetable gardening shall not show a decline, but an improvement in agricultural industry, and that the title "Market Gardening" be used in place of "Truck Farming," it being more appropriate, more respectable and better understood in the foreign governments with which we exchange reports.

CAPE MAY COUNTY.

OFFICERS FOR 1898.

President.....Dr. E. H. Phillips .....Cape May City.
Vice President.....A. B. Walters.....Cold Spring.
Secretary.....H. L. Sabsovich .....Woodbine.
Treasurer.....Volney Van Gilder ..... Ocean View.

BOARD OF DIRECTORS.

Edward Leaming.....Cold Spring, Lower township.
Francis Harris.....Rio Grande, Middle township.
Winfield Coons.....Goshen, Middle township.
Hollis B. Mickel.....Petersburg, Upper township.
A. Stratton, Esq .....Beesley's Point, Upper township.
Samuel Kirk.. .....Erma Post Office, Lower township.
Hon. F. Ludlam .....South Dennis, Dennis township.
Jesse D. Ludlam.....South Dennis, Dennis township.
John Reeves.....West Cape May Borough.

DELEGATES TO STATE BOARD.

Fred. Schmidt (one year).....Woodbine, Dennis township.
Francis Harris (two years).....Rio Grande, Middle township.

REPORT.

BY THE SECRETARY.

THE WORKING OF THE BOARD.

Our Board held three meetings during the past agricultural year at the county seat. The first meeting took place on February 19th, where the delegates to the State Board of Agriculture reported the proceedings of that body for the edification of our farmers. Special attention of the latter was called to the necessity of organization to gain some control over the markets, or rather over the commission merchants, and also for cheaper purchase of seeds and fertilizers.

The result of the discussion was the invitation of lecturers and organizers of the State Grange and State Alliance.

The second meeting of two sessions was held on March 17th, for the purpose of listening to the lecturers sent out by the above-named State organizations. At the afternoon session a Farmers' Alliance branch was organized. The people of the lower portion of the county (being in the minority) wanted a Grange, and those of the upper portion of the county (being in the majority) wanted a Farmers' Alliance. Not to endanger the existence of the County Board of Agriculture, it was deemed advisable to make the Alliance an independent organization, which is now quite active in Dennis township, the place of their meetings South Seaville, the second Saturday in each month.

The third meeting took place on October 15th, where the results of the year in regard to crops, yields and prices were thoroughly discussed. At the conclusion of this meeting officers and delegates to the State Board of Agriculture, as well as to the State Horticultural Society, were elected. The interest toward the work of the County and State Boards of Agriculture has increased considerably among our farmers, especially in the upper portion of the county.

The last year's Farmers' Institute of three sessions, held November 12th and 13th, 1896, at the county seat, was undoubtedly a success. Subjects of highest interest for our farmers were discussed, with great profit to the audience. An especially good impression was made by the Hon. F. E. Dawley, in his treatment of the manifold sides of dairying.

METEOROLOGICAL OBSERVATIONS.

Meteorological observations are taken regularly at least once a day at four points in the county—Cape May City, with an elevation over sea-level of eleven feet, Ocean City of twelve, Cape May Court House of nineteen and Woodbine of forty-three feet. The first three points belong to the so-called Seacoast region, Woodbine to the Southern Interior region, hence the more or less marked difference in temperature and precipitation in Woodbine and in the other points of observation. Table I. shows the temperature and precipitation for the county and Woodbine for eight months—March to October—during which our crops are planted, grown and harvested. Table

II. compares the precipitation for the last three years, 1895–1897, by seasons and growth for the county and Woodbine; the fall precipitation for 1897 for the county covers only two months, September and October; for Woodbine alone, the three fall months. The same is true as to the total precipitation for the growing-season for 1897.

Table III. compares the mean temperature for the same period of years. The fall mean for the county for 1897 is made out from two fall months, September and October; for Woodbine, for all three months.

The winter of 1896–97, regardless of the severe cold, has been a very favorable one to all winter crops, small grain and clover. The spring of 1897 opened comparatively late on account of the unusually cold March, but the favorable weather of April has considerably helped the farmers to gain in work what they lost during March. About the middle of April most of the fruit trees were in bloom, especially the peach, cherry, plum and pear, also strawberries. But the frost of 20th and 21st of April (26° and 21° F. respectively) killed the blossoms and buds of the late peaches, Japanese plums, pear trees, cherry trees and partly early strawberries. During May we had several heavy rains and about a dozen showers, which would have greatly favored the growth but for the cold nights and mornings, which retarded the growth of the more tender vegetables. For crimson clover the weather was ideal. Toward the middle of June the weather improved so greatly that all growing crops were benefited by it, when suddenly the heavy storm of the 25th of June caused severe damage to most of the crops, especially in the lower portion of our county. While during the first week of July there was felt some deficiency of moisture, for the last three weeks of the month there were 16 rainy days, often accompanied by heavy storms, damaging the crops.

During August the night showers and frequent thunder storms in the lower part of the county followed by hot sunshine during the day greatly damaged all vine crops, as watermelons, tomatoes, late potatoes, &c. September and part of October were dry, but the soil being saturated with moisture from the previous month did not interfere with fall plowing and seeding, and the subsequent rains and showers greatly improved the growth of crimson clover and rye.

As seen from above, the past year was distinguished for cold nights,

heavy storms, hot sunshine in summer, warm and dry fall. While the vine crops have suffered considerably from these abnormal weather conditions, early potatoes, corn, clover and other hays, as well as small fruits, yielded fair-paying crops.

GENERAL STANDING OF AGRICULTURE.

Table IV. shows the yields of the different crops and the prices received for them. From different kinds of small grain, only *oats* are cultivated to some extent, *rye* rather for green manuring, and some ancient farmers are continuing to raise *wheat;* but *corn* is the king grain-crop, raised quite extensively, and by some quite successfully. Mr. Lewis Wheaton, of Court House, has succeeded in raising as high as 60 bushels shelled corn upon crimson clover sod sprinkled with a light coat of coarse barnyard manure. The value of the cornstalk is getting to be more and more appreciated, not only as a fodder substitute, but as a fodder proper, especially by farmers who cannot raise hay and do not possess meadows.

From the leguminous fodders the *crimson clover* and *cow-pea* are gaining favor with our farmers. Their value is the more appreciated by them, for the stubble helps to renovate the fertility of the soil. For soiling, green manuring, they are not excelled by any other crops; even as hay they may be counted in the front rank. All live stock on the farm relish them. There is one serious fault with the cow-pea, that it permits the growth of crab-grass, although it keeps up the cow-pea plant straight and helps to dry it faster, acting as an absorbent when mowed down.

The *potato crop* as a whole was a failure, though one of the correspondents from Upper township reports an unusually fine crop of early potatoes.

Sweet potatoes ought to be cultivated more extensively for the market, as our light sands can produce as fine a sweet potato as around Vineland. At the Russian-Jewish Fair in Philadelphia, held October 30th to November 7th, I had an opportunity to compare the sweet potatoes raised in Cumberland, Salem and Cape May counties, and found that our sweet potatoes are not inferior to the others in color, shape and taste.

Fruit-raising ought to be taken up more by our farmers, especially by those of the northern portion of the county. After the first in-

vestment is made in orchards and small fruit patches the intelligent farmer can with small expenses realize considerably larger incomes per acre than from any field crop. My experience in raising small fruit, grapes and tree fruits, at Woodbine, and especially on the farm of the Baron de Hirsch Agricultural School of Woodbine, during the five years 1892–1897, leads me to believe that while we may not be fully successful in raising apples, and may positively fail in raising sweet cherries, we can expect to be quite successful with peaches, pears, partly plums, especially with the native varieties as the Newmans of the Chickasaw family, sour cherries, grapes for wine, and strawberries. Though the April frosts have reduced the peach crop, I have not changed my opinion about the possibility of raising abundant crops of fine peaches in the upper part of the county. Our five-year-old pear orchards have just begun to bear fine fruit.

The *grape vines* yielded not less than 5,000 pounds to the acre. The varieties we raise in Woodbine, Ives Seedling and Ironclad, did not suffer from mildew or any other fungous diseases, and, happily, we have not been bothered by the rose-bugs, which have reduced the crop in our neighboring counties to 50 per cent.

The three-acre patch of *strawberries* on our school-farm yielded 11,290 quarts. The land has not received any extra treatment as to fertilizers. The berries have been planted after one crop of crimson clover and cow-peas. The patch got in the fall of 1896 about 600 pounds of kainit and 300 pounds of bone, and in the spring of 1897 about 200 pounds of nitrate of soda, to the acre.

Wine-making of small fruits and grapes, when the market prices of these products become so low that it is unprofitable for the farmer to ship them, could become, quite helpful to the small farmer especially. The temperance question could be settled by making unfermented wines. The farmers in general ought to move their brains a little more, and each try to find out for himself some collateral source of income.

For the last three years the Woodbine Agricultural School has been endeavoring to make *bee-keeping* pay and has apparently succeeded. With the modern beehive one can almost double the yield of the honey crop by controlling and directing the work of the bees.

The school has also experimented as to the best methods of raising *mushrooms* in greenhouses and cellars, and I think that it will soon be able to prove that, with a small outlay, every farmer can start mushroom culture in cellars.

As to the prices in general, they ruled on field crops and some fruits better than last year.

There were less complaints of insects and fungous pests on plants. The county has suffered from the *hog cholera*, during September and November, to such an extent that the farmers had to slaughter their hogs prematurely, as they would have perished from the cholera. In the neighborhood of Tuckahoe alone there were not less than fifty cases reported.

TABLE I.*

	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
Precipitation, county.....	2.64	3.59	2.62	2.65	7.93	2.48	.55	5.70
" Woodbine.....	2.28	3.68	2.76	2.58	7.07	2.25	.90	5.76
Temperature Mean Co.....	41.9	49.8	59.6	66.9	73.5	72.4	67.4	57.1
" " Wood...	40.5	50.0	59.9	66.4	73.6	71.6	65.5	56.8
" Max. Co.....	69.0	71.5	80.2	92.2	88.0	87.5	95.0	84.0
" " Wood...	74.0	80.0	83.0	94.0	89.0	87.0	93.0	87.0
" Minin. Co.....	21.0	27.0	41.2	44.5	60.0	55.3	41.0	34.0
" " Wood..	15.0	21.0	40.0	36.0	57.0	50.0	35.0	26.0

November Woodbine Precipitation... 2.89
Mean..... 45.33
Maximum..... 64.00
Minimum..... 15.00

TABLE II.*

PRECIPITATION IN INCHES.

		Spring.	Summer.	Fall.		Total Mar. to Oct.	
1895	County.....	11.65	4.73	6.21 =		22.59	
	Woodbine	12.68	4.86	6.92 =		24.46	
1896	County.....	8.73	13.19	8.22 =		30.14	
	Woodbine.....	7.10	10.21	9.92 =		27.23	
1897.	Woodbine.....	8.72	11.90	9.55 =		30.17	
1897	County.....	8.85	13.06	6.25	Sept., Oct.,	28.16	
	Woodbine.....	8.77	11.90	6.66		27.28	

TABLE III.*

MEAN TEMPERATURE.

		Spring.	Summer.	Fall.		
1897	County	50.4	70.9	62.2		
	Woodbine	50.1	70.5	61.1	resp.	55.9
1896	County	51.4	72.0	.....		56.9
	Woodbine	53.2	70.8	.....		54.0
1895	County	48.8	72.4	.....		56.9
	Woodbine	49.3	72.0	.....		55.1

*See Meteorological Observations in body of report.

TABLE IV.

	Per Cent.			
Corn	75	(bushels)	30	$0 40
Wheat	100	(bushels)	25	1 00
Rye	50	(bushels)	10	70
Oats	100	(bushels)	25	35
Buckwheat	86	(bushels)	10	60
Hay	100	(tons)	1½	10 00
Potatoes, white	66	(barrels)	22	2 00
Potatoes, sweet	50	(barrels)	25	2 00
Apples	75	(barrels)	35	2 00
Pears	75	(barrels)	35	2 50
Peaches	80	(baskets)	200	50
Grapes	125	(pounds)	4,000	1½
Strawberries	100	(quarts)	2,500	5
Raspberries	90	(quarts)	400	9
Blackberries	100	(quarts)	2,000	7
Watermelons	25	(hundreds)	25	7 00
Citron Melons	80	(baskets)	400	25
Cucumbers	.....		.....	.....
Cabbages	50	(hundreds)	20	3 00
Tomatoes	60			

Horses	100	between 3 and 7 years old,	$60 00
Mules	100	between 3 and 7 years old,	75 00
Milch Cows	100	between 3 and 7 years old,	27 50
Swine	90	per pound December,	6
Poultry—Turkeys	110	per pound November and December,	13
Poultry—Chickens	110	per pound November and December,	12

CUMBERLAND COUNTY.

OFFICERS FOR 1898.

President	WILLIAM HUETT	Bridgeton.
Secretary	H. O. NEWCOMB	Cedarville.
Treasurer	THEO. F. D. BAKER	Bridgeton.

EXECUTIVE COMMITTEE.

W. S BACON, MARK DARE	Greenwich township.
JOHN GARRISON, JOHN RAINEER	Stow Creek township.
W. S. BONHAM, ELI MINCH	Hopewell township.
W. L. WOODRUFF, ARTHUR SEABROOK	Deerfield township.
S. T. DOWLER, A. P. ARNOLD	Landis township.
J. CHAMBERS, JONATHAN LORE	Maurice River township.
JOSEPH SHROPSHIRE, PETER LADEW	Commercial township.
OLIVER GANDY, PETER LADEW	Downe township.
W. S. GANDY, J. T. WHITAKER	Fairfield township.
CHARLES DUBSAFE, HARRY LINCENBURG	Lawrence township.

DELEGATES TO STATE BOARD.

WM. HUETT (one year)	Bridgeton.
H. O. NEWCOMB (two years)	Cedarville.

REPORT.

BY THE SECRETARY.

We have held one Institute under the auspices of the State Board of Agriculture and one regular meeting of the County Board during the year. The Institute, which was held at Shiloh, was one of the very best ever held in this county. The attendance was large and the interest, from beginning to close, very marked. This regular meeting was held on April 22d, in the Court House. The officers as named were elected for the ensuing year.

The year 1897 has been better with the farmers of this county

than for several years preceding. Most crops have been good and, with the exception of the late tomato crop, have been far above the average.

Corn is far above last year. In some cases this yield has been three times greater.

Wheat is not grown to any great extent, but the yield has been good and prices a great deal better.

Rye is not grown for anything except pasture and to plow in for manure.

Oats were an unusually large crop, but the wet weather at the time of harvest did great damage.

Hay has yielded an abundant crop and more has been cut than for several years past.

White Potatoes have been a little more than average crop, and the prices for late have more than doubled last year's prices.

Sweet Potatoes have been a very poor yield, but the prices have been so much better that the farmers have made a great deal more money than was made last year from the larger crop.

Apples have been plentiful.

Pears.—A good crop but poor sale.

Strawberries have been a very good crop and the prices have been as good as could be expected, considering the heavy yield. We have some of the best strawberry land in the State, we think, and there have been some very fancy prices received. We were not troubled to any great extent with the strawberry beetle this year. We hope it has left us for good.

Citrons, *Melons* and *Cantaloupes* have been a large crop, but prices have been very poor. We were not troubled with the vine-louse.

Cabbage.—Early cabbage was a very large crop, prices ranging about one-third better than last year. Late cabbage—large crop, poor sale; most of it buried until spring.

Tomatoes.—Early tomatoes—crop good, prices fair. Late tomatoes—crop poor (very poor); only about an average of two tons to the acre. While some had two tons, others had next to nothing. The crop never looked more promising than it did the last of June and the first of July, but the rains came and no sunshine, and they scalded, and were nearly a total failure.

Peaches have been more than an average crop. Prices have been low in the cities, but home market prices have been fair.

ESSEX COUNTY.

OFFICERS FOR 1898.

President	A. E. HEDDEN	Verona.
Vice President	WILLIAM DEICKS	Livingston.
Secretary	J. H. M. COOK	Caldwell.
Treasurer	GEORGE E. DE CAMP	Roseland.

DIRECTORS.

C. B. CRANE	Caldwell.
J. S. CRANE	Livingston.
S. H. BURNETT	
A. W. HARRISON	Livingston.
JOSEPH B. WARD	Lyons Farms.

There is very little change in the agricultural status of Essex county. We still enjoy the benefits of our rural life, but full prosperity is not yet realized. The advanced prices in trade are mostly on goods that the farmers buy, while any advance in farm products is the result of short production.

The early spring was very favorable to plant growth, and the abundance of rain caused a large crop of grass and very fine pasture. The clover grasses, especially, grew luxuriantly, and our hay crop was large. A few weeks of clear dry weather was favorable for storing hay. But the heavy rains in July injured the grass not cut early, and it was mostly ruined on the upland. The continued overflow of all the Passaic valley ruined the thousands of acres of low-ground hay. This is a very serious loss to our county.

The potato crop was almost an entire failure. In many cases they were all destroyed by rotting and not worth digging, although a few fields located on hillsides were not all destroyed. These were saved and sold very well.

The fruit crop of the county, although not very large, was excellent in quality and quite free from injury by insects. Spraying is done

only by the few who make a specialty of fruit-growing. But most of our farmers have some fruit to sell in our local markets.

The market-gardener has had quite a prosperous year. Almost all garden products grew well, and in most cases remunerative prices were obtained.

Milk has been produced in larger abundance than ever before, and the price has declined, while some advance in the price of feed has made the dairy less remunerative. Still it is the leading industry of the county, and for those who obtain retail prices it is the best. It furnishes employment through the whole year and provides the best fertilizer.

Our dairies are, so far as I know, free from disease.

B. F. Onderdonk, of Mountain View, gives his experience in poultry management. He says:

"I sold all of my old hens and cockerels and went into winter quarters with thirty black pullets and fifteen white ones, five old hens and two cocks. The Minorca and Leghorn are nearly all bred out. The hens weigh six to eight pounds, of perfect form, beautiful plumage and much smaller combs; the skin is yellow. I feed oats and wheat for breakfast unless it is exceedingly cold, then they have a hot mash of ground feed (such as used for horses), with table scraps, peelings boiled, and three times each week one and a half pounds of ground scrap. When this mash is not fed in the morning they get it at noon with whole corn at night; all food and water warmed when the temperature is about 20° or lower. Keep the hens in the houses until 9 o'clock A. M. in cold weather, and do not let them out into the snow. As to results, January, 642 eggs, averaging $3\frac{1}{8}$ cents; February, up to and including the 22d, 503 eggs, averaging $2\frac{3}{4}$ cents. Average cost of feed $3.50 per month. Best house 10 x 16 feet, facing south, a four-foot square window in each front end, partitioned so as to leave two rooms, 10 x 8 feet, with roosts parallel with partitions; roosts level, two feet from floor, with dropping-board under; eaves in front, four feet six; at rear, seven feet; roof sloping from front nine feet to three feet at back, giving a large sun area. This will accommodate fifty fowls very comfortably, and in summer the windows are open, and most of the hens are mothering broods outside. I do not use incubators."

FLOWERS.

BY F. C. GOBLE.

The condition of the florist's business in this county is not encouraging—as the necessaries of life have the first claim in the family expense, the florist has to suffer.

The attempt to increase profits by increasing production has had the opposite effect. Overproduction has resulted in still lower prices.

More and far better roses, chrysanthemums, carnations and violets, &c., are produced than ever before. A very large number of our growers confining their efforts to some one flower, and in roses to even one variety, results in the production of finer stock than when an attempt is made to grow everything.

Great improvements in the carnation have been made in the last few years by the raising of seedlings. A good scarlet is now wanted over the shade of Partia with the size and productiveness of Scott.

The chrysanthemum has evidently reached its zenith, as far as size is concerned, the demand this fall being for well-finished flowers of good size, rather than the extra-sized ones not so nicely done.

Of bedding plants there is still a large trade, notwithstanding many beds have been sodded over.

The geranium seems to be a prime favorite with the masses. More were grown and sold than of any other one plant in the greenhouse.

Great improvement has been made with it in the last year or two, both in size of truss and flower, freedom of bloom, and in endless variety of shades.

Diseases and insects are abundant. It does seem that our Experiment Station might look after the interests of the florists of our State. Although their numbers are few, the value of their annual output is large.

THE APIARY.

The large amount of honey gathered this year will give a great impetus to this industry. Not in the memory of old bee-keepers have the flowers yielded such a bountiful flow of nectar as in the past summer, and the honey is of an excellent quality. Many bee-keepers report an average of more than one hundred pounds per colony, with prices ranging, according to quality, from twelve and a half to twenty cents per pound.

ROADS.

The building of hard roads has been pushed forward with commendable energy. In several instances our people have availed themselves of the State appropriation, and we now have several fine stone roads extending through the county. The trolley company is also extending its track out in our farming districts, and thus our facilities for communication and travel are daily increasing. The next step for our comfort should be rural delivery of the mails.

PASSAIC DRAINAGE.

The work of draining the Passaic valley is still delayed, with no immediate prospect of resumption. After the expenditure of a large amount of money in a way that cannot secure any benefit until the whole plan is entirely carried out, the work came to a standstill about five years ago from lack of funds, and the landowners are left in the unpleasant position of an impending assessment for the payment of maturing bonds, with the land still useless, and the loss of crops of grass every few years, enough to pay the whole expense of completing the entire work.

GLOUCESTER COUNTY.

OFFICERS FOR 1898.

President	WM. H. HOFFMAN	Mickleton.
Vice President	CHARLES TURNER	Hurfville.
Secretary	ELMER BRADSHAW	Mickleton.
Treasurer	THEODORE BROWN	Swedesboro.

EXECUTIVE COMMITTEE.

ALBERT HERITAGE	Swedesboro.
B. FRANK RULON	Swedesboro.
BEULAH GARDNER	Mullica Hill.
ANNIE BRADSHAW	Mickleton.
GEORGE C. TONKIN	Mullica Hill.

DELEGATES TO STATE BOARD.—George H. Horner, Mullica Hill, two years; Walter Heritage, Mullica Hill, one year.

REPORT.

BY THE SECRETARY.

There have been four regular meetings held this year as follows: March 2d, June 1st, September 1st and December 6th. They were all well attended and a great deal of interest manifested at each. There were topics pertaining to the interest of the farmer or his crops discussed at each and every meeting, and I am satisfied there has been much information gained on this line.

We in this county are trying to work for the good of others as well as ourselves. Our meetings grow larger every time we meet, which is a good sign that they must be interesting and profitable. The ladies (quite a number of them) have been meeting with us the last year and helping us on with the good work; this may have something to do with our numbers increasing, and there have been

two ladies appointed on the Executive Committee, so we are going to try and keep them in the harness.

There was one Institute held at Swedesboro which I was unable to attend, but am told that it was a success in every way, and believe that much good will result from it. As the Secretary of the State Board presided at this meeting he has a knowledge of its worth.

The condition of agriculture in this county, so far as I have any knowledge, is very prosperous at the present time and seems to be looking into a bright future. The farmers generally are improving their stock and poultry, but as to price of poultry it has not been very high lately. As to the fruit, there seems to be an inclination at present with a great many to tear up the old trees that are almost worthless and put out other and better varieties, which is not a bad idea. In conclusion let me say the farmers are not going with their heads bowed as they did last year, but all have a bright and cheerful look. The County Board is working, the Grange is working and we all are working to improve the condition of the farmer and his interest, and trust that Divine Providence will continue to smile upon the tillers of the soil.

HUNTERDON COUNTY.

OFFICERS FOR 1898.

President	V. R. MATHEWS	Ringoes.
Vice President	JOHN T. COX	Readington.
Secretary	WM. W. CASE	Baptisttown.
Treasurer	I. H. HOFFMAN	Baptisttown.

DIRECTORS.

H. F. BODINE, Hunterdon County Pomona Grange.
F. S. HOLCOMBE, Ringoes Grange.
WM. B. HOCKENBURY, Locktown Grange.
JAS. HAGERMAN, Sergeantsville Grange.
JAS LANG, Readington Grange.
J. S. KERR, Kingwood Grange.
WM. DUBON, Oak Grove Grange.
M. W. ANGELL, Spring Mills Grange.
W. W. CONOVER, Hunterdon County Farmers' Alliance.
DAVID COLE, Pleasant Run Alliance.
J. R. FOSTER, Three Bridges Alliance.
JOSIAH PRALL, Sand Brook Alliance.
STEWART BELLIS, Flemington Alliance.
A. B. ALLEN, New Jersey Fruit Exchange.
A. B. ALLEN, Hunterdon County Peach Exchange.

DELEGATES TO STATE BOARD.—James Lane, Readington, one year; I. H. Hoffman, Baptisttown, two years.

COMMITTEE ON PEACH STATISTICS AND REPORTER TO STATE BOARD OF AGRICULTURE.—Wm. W. Case.

Regular meetings of the County Board, third Saturday in April, August and November.

Other organizations in county:

NEW JERSEY PEACH EXCHANGE.

President	JOHN T. COX	Readington.
Secretary	H. F. BODINE	Locktown.

HUNTERDON COUNTY PEACH EXCHANGE.

President.....N. B. BOILEAU.....Jutland.
Secretary.....P. M. MECHLING.....Pittstown.

HUNTERDON COUNTY FARMERS' ALLIANCE AND INDUSTRIAL UNION.

President.....WILLIAM WENZEL.....Flemington.
Secretary.....GEORGE BRITTON.....Flemington.

SUB-ALLIANCES.

Sand Brook, Pleasant Run, Three Bridges and Flemington.

HUNTERDON COUNTY POMONA GRANGE.

Master.....H. F. BODINE.....Locktown.
Secretary.....BESSIE SKED.....Ringoes.

For subordinate granges, see Grange report.

REPORT.

BY THE SECRETARY.

Three regular meetings of the County Board have been held; two, April and August, at Locktown, and the third, annual, at Flemington.

At the April meeting, President Mathews spoke on "The Relation of the Grange to the County Board, and the Advantages to be Derived by Co-operating One With the Other."

G. W. Hockenbury, Superintendent of the Locktown Dairymen's Association Creamery, then addressed the Board on "The Feeding of Quality into Milk."

Mr. Hockenbury is opposed to the modern doctrine that feeds of different composition do not affect the quality of milk, but only the

quantity. He addressed many facts in support of his arguments. He stated that in the month of September many of the creamery patrons resort to feeding green cornstalks to supplement the pasture, and invariably the milk of such herds immediately began to decrease in butter-fat as shown by the tester, although the quantity is sensibly increased. Herds also fed on rich, highly-concentrated foods also show an increase in butter-fat by the tester.

George R. Scott, of Pennsylvania, who is proprietor of a number of creameries, spoke in the same tenor as Mr. Hockenbury. He thought that farmers frequently made a mistake in feeding a highly-concentrated food, which tended to a high test, when a more succulent ration would give better financial results; for instance, a cow yielding 20 pounds of milk daily on a rich food, testing, say, 4 pounds to the 100, might on a more succulent ration be increased to 30 pounds daily, although the test would probably drop to 3.80 or even less, but the net results would be much more in the last instance to the producer, than in the first, for obvious reasons.

The August meeting was largely attended. A paper was read by the Secretary on "The Game Laws and Farmers' Rights."

[As the main points treated by the Secretary are contained in the discussion of this question at the State Board in connection with State Grange report, the address is omitted from this report.]

After the game question was disposed of the Board was addressed by Prof. E. B. Voorhees, of the State Agricultural College, on "Co-operation in the Purchase and Mixing of Commercial Fertilizers."

Locktown Grange has co-operated in purchasing fertilizers for several years. Their purchases for the last year aggregated about seventy tons, costing $1,318, while the Grange aggregate purchases throughout the county amounted to nearly one hundred tons for the past year.

The following is a formula in great favor for winter grain: Muriate of potash 200 pounds, bone-black 800 pounds, raw bone 1,000 pounds. The following, though being slightly more expensive, seems to have more than enough difference in effect on the following clover crop than the amount of difference in the cost, and is the mixture I use exclusively: Muriate of potash 400 pounds, bone-black 800 pounds, raw bone 800 pounds.

The November meeting was principally a business meeting.

BEE KEEPING.

In spite of disease the honey crop was large, and where properly put up and judiciously marketed brought very satisfactory prices, even as high as 14 cents per pound.

FRUIT.

Owing to the late freezes, strawberries, cherries, &c., were more or less failures. Apples not more than quarter crop. Peaches, a rather large crop, but in spite of failure in Delaware and other peach sections, prices for the whole season were the lowest on record. The net receipts from city shipments were not more than 20 cents, leaving cost of baskets, picking, carting, &c., still to be defrayed. I saw one gentleman foot up his returns on 3,700 baskets, and they averaged, net, less than 13 cents per basket—baskets and picking still to be paid for. Of course much fruit was inferior. Fruit that fifteen or twenty years ago would have brought $1.50 to $2 per basket, this year did well to bring 30 to 40 cents.

The New Jersey Fruit Exchange at Flemington sold 33,113 baskets at 34 cents per basket; the Hunterdon County Exchange at Pittstown, 30,264 baskets at 33¾ cents.

The Pennsylvania railroad carried 228,504 baskets; the Lehigh Valley railroad, 376,507 baskets; the New Jersey Central, 659,820 baskets and the Rockaway Valley railroad, 425,000 baskets; total for the county, 1,689,831 baskets.

DAIRYING.

Dairying seems to be on the increase, and each year more new creameries are erected; they now number about a score.

I regret exceedingly that the different creameries throughout the county seem loth to give the amount of milk manufactured by them annually, and the price paid for the same. Letters of inquiry sent to twenty different points have been responded to in but three instances.

REPORT OF THE WORKINGS OF THE LOCKTOWN CREAMERY, FOR THE YEAR ENDING OCTOBER 31ST, 1897. COMPILED BY GEORGE W. HOCKENBURY, SECRETARY AND SUPERINTENDENT.

MONTH.	Number of pounds of milk received.	Number of pounds of butter made.	Butter sold for	Skim milk sold for	Average test of all milk received.	Price paid per pound for butter-fat.	Average price paid per 100 pounds for milk.
1896.							
November	119,106	6,171	$1,419 03	$51 49	4.79	$0 23	$1 10+
December	107,348	6,605	1,346 43	48 00	4 85	24	1 16+
1897.							
January	104,132	5,517	1,174 85	41 05	4.79	21	1 01—
February	96,551	4,824	1,027 91	37 77	4 69	20	94—
March	111,184	5,515	1,143 66	43 68	4.54	20	91—
April	122,416	5,779	1,174 45	68 94	4 45	20	89
May	166,083	7,866	1,307 14	83 77	4.08	18	73+
June	198,416	9,469	1,492 51	95 93	4.12	17	70+
July	183,198	8,518	1,370 92	96 04	4.06	17	69+
August	191,522	8,961	1,556 01	95 70	4.14	18	75—
September	202,668	9,783	1,936 60	101 09	4.18	21	88—
October	183,801	9,126	2,112 15	90 36	4.36	24	1 05—
Total	1,786,425	87,134	$17,061 66	$853 82	.....	.....	.....

NOTE.—It will be noticed that there is a falling off in the test beginning with the month of May. This comes from using the Babcock test, the bottles of which are graduated to register about one-quarter of one per cent. lower than the Biembling test, which was used up to May 1st, 1897.

FARMERS' INSTITUTES.

Since the date of my last report four Farmers' Institutes have been held in the county by the State Board, one at Pittstown holiday week last year, and one at Locktown immediately succeeding the above. During the present fall one was held at Locktown on November 11th and 12th, and at Ringoes on evening of the 12th, and all day on 13th. These meetings are greatly appreciated by all who attend them, and we hope the good work entered upon by the State Board will be continued in the future.

TOMATOES.

The tomato pack, owing to unfavorable weather conditions, is one of the smallest on record, some of the factories being unable to get enough fruit to fill their orders. I am unable to give exact figures, as all my requests for data have been quietly ignored by the packers.

FARM CROPS, ETC.

Corn, owing to excessive wet in planting, followed by drouth, did not yield more than 65 per cent. of a crop; price per bushel, December 1st, 30 cents.

Wheat and rye crops among the best in years, though some of it badly damaged by storms during harvest; price December 1st, wheat, 90 cents; rye, 40 cents.

Oats were very promising until harvest time, when excessive rains nearly ruined the crop on many farms; price December 1st, 20 cents.

Buckwheat slightly under the average and yield, both in acreage and quality; price, 40 cents.

Although much land is on the market, but little is changing hands at any price, certainly not at an advanced one.

Hay crop about normal, but prices lowest in years ranging from $5 per ton up to $7 for prime timothy.

Rye straw, $6 per ton; oat, wheat and tangled rye straw, $5 per ton.

MERCER COUNTY.

OFFICERS FOR 1898.

President.....WALLACE LANNING.
Vice President.....J. M. DALRYMPLE.
Treasurer.....H. R. WITHINGTON.
Secretary.....FRANKLIN DYE.

DIRECTORS.—J. V. Green, J. B. Horn, A. L. Holcombe, H. E. Hale, D. C. McGalliard, T. B. De Cou, Chas. Black, Gilbert D. Rue, Samuel F. Fowler, I. J. Blackwell.

LEGISLATIVE COMMITTEE.—S. B. Ketcham, J. V. Green, A. D. Anderson.

DELEGATES TO STATE BOARD.—A. D. Anderson, one year; Hon. J. D. Rue, 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.
Titusville Agricultural Association.

REPORT.

BY THE SECRETARY.

The agricultural year ending, so far as crop-growing is concerned, with November 30th has not been marked by any special features of unusual importance to the farmers of the county. They have attempted to produce such crops as it seemed to them at the opening of the year would be of most profit.

But early hopes, based upon usual conditions of success, are not always realized. And although the prices received for some crops have been encouraging, the yield of some others has been reduced by unfavorable conditions.

For example, the protracted wet weather in the spring and early summer retarded healthy growth and forced a crop of weeds, which it was impossible to overcome owing to the wet condition of the soil. These became strong competitors of the crops for the plant-food provided for them. Corn, potatoes and tomatoes were injured in this way. Peaches forced by the wet weather, early, to too rapid a growth of a watery character, did not regain normal conditions of color, size and flavor, and were thus put on the market with the result of low prices for the crop. Apples were but a partial yield, not more than 33 per cent of a normal crop.

Grass, on the other hand, reveling in the wet weather, produced a large crop, but prices for hay are lower than for years previous. The causes contributing to this result are, a larger crop than the year previous and decreased demand for this standard product in cities, owing to the introduction of electricity as a motive power, which has reduced the number of horses in cities.

The yields and values of staple crops at October prices are about as follows:

Crop.	Acres.	Bushels per Acre.	Yield—Bushels.	Price.	Value.
Corn	21,673	38	823,574	$0 35	$288,250 19
Wheat	11,985	27	323,595	94	304,179 30
Rye	4,579	18	82,422	46	38,914 12
Oats	11,665	27	314,955	25	78,738 75
Hay	22,814	1.66 tons.	37,871 tons.	9 00	340,839 00
White potatoes	1,659	90	149,310	65	97,051 50
Total value					$1,147,972 86

The dairy business of the county is large, owing both to local demands in our numerous cities and towns, and because of quick railroad transportation to other large cities lying so near our borders. The local demand is also increased by the added population in our numerous schools and this, to some extent, must also affect the demand for other farm products, especially poultry and eggs, early vegetables and fruits. Considering the price of cows and the total cost of production, the selling price of milk is lower than it should be. Most other commodities that are handled by speculators—merchants if you please—are soon affected by a rise in price of any part of their composition. Should not producers of milk have the same advantage?

The general health of our dairy stock is good, and dairy management is improving in the county. No cases of sickness, so far as I

am informed, have been associated with the milk-supply during the year past; and all dairymen should be most vigilant in this direction. Aside from the menace to human health and even life itself, arising from milk contaminated with disease germs, there is no other one cause that so unpopularizes the individual selling such milk, and it also brings the fraternity into more or less suspicion.

Taking the season as a whole, the farmers of the county are encouraged by better prices for some crops and they are more hopeful for paying returns for the immediate future. Certain it is that no county in general has a more productive soil and better market facilities than Mercer, and with its exceptional social and educational advantages, there needs only a continuous remunerative price for farm products to restore the farming business in this county to its former popularity and our farms to a higher value.

The County Board of Agriculture is not sustained by the co-operation of the farmers of the county as it should be. If there is any one thing more than another that might be of untold value to them as a class, if utilized as it should be, it is organization and co-operation.

Complaining that they do not get their rights, they fail to take the first step for mutual improvement. And confidence is often placed in the words of strangers exploiting some new invention, fruit or fertilizer, while the neighbor of tested character and veracity is frequently regarded with suspicion. These things ought not to be so.

Owing to this lack of interest in helpful organizations the County Board is slimly attended, and those who are trying to keep it in active operation become discouraged. And this is true of other organizations of value to farmers. If this spirit of indifference continues, what of the future?

The proceedings of the Board have been of the usual helpful character as to the subjects treated and discussed, and those who have attended the meetings have expressed their appreciation of the efforts made in this way to improve the agricultural practice in the county.

The annual meeting, March 30th, resulted in the election of the officers whose names appear at the head of the report, and reports were made by the delegates to the State Board of Agriculture as to its doings at the preceding annual meeting, as is required by law. The delegates to the Horticultural Society of the State also made report of its work.

This method of reporting back to the local organizations by the delegates to the larger bodies their proceedings is in every way helpful. It widens and unifies interest in the general work while conveying to those not able to attend much valuable information.

At this meeting the President of the Board delivered the annual address as follows:

GENTLEMEN—Our Board, organized under most auspicious and encouraging circumstances a few years since, is not the strong, well-attended and wide-awake Board that it was for a few years after its organization. You may ask me why not. I refer this question back to each individual member of the Board and let him ask himself the question, Have I been prompt in attendance upon its sessions? Have I been willing to aid its officers in planning and suggesting something that would add to the interest of our meetings and be instructive to those present at such meetings?

If we expect to have interesting and well-attended meetings, each member must be prompt in attending and willing to give his experience as well as receive that of others. Upon the interchange of thought and of experience upon the planting, cultivating, fertilizing, harvesting and marketing of the agricultural products depend the usefulness and worth of our County Board.

The farmer of to-day who expects to live by his profession must be a man of good health, industrious habits, even temper, self-sacrificing spirit, close observation and "Jack of all trades and master of many" if he expects to succeed in his business.

Of good health, first, because he must be exposed to sunshine and to rain, to heat and to cold, to drifting snow and to icy sleet; indeed, all the elements in whatever form they may appear, he must be prepared to encounter and pursue his task with unabating zeal.

He must be of industrious habits, because no farmer of to-day can expect to succeed unless industry and thrift be the motto that is constantly before him.

Even temper, because he will have much to try his temper in his association with farm help, the management of the machinery and the care of domestic animals. In none of these cases does an even temper and quiet disposition work out better results than in the latter, the case of the domestic animals. A sudden outburst of temper, demonstrated by kicks and slashes, in nearly every case makes the animal

more unruly and reduces the product of the same. Thus the blow delivered in a fit of passion upon our animals in its rebound falls heavily upon the man who deals it or allows it.

Close observation, because the farmer who lives to-day with his eyes partially closed to the improvements of the day in agriculture is living behind the age and cannot be successful as an agriculturist.

A Jack of all trades, because he must be able to set up, to tear apart and keep in running condition all the machinery of the farm. He must have a knowledge of the constituents of plant-food, the amount of each constituent needed in different crops, the manipulation and application of the same. He must be somewhat of a veterinarian, to be able to give the right care and proper attention to the animals on the farm that constantly demand his kindest care as physician and nurse in order that they may be profitable.

HOW THE FARM PAYS.

I think I am safe in saying that there are very few farms in our county that for the last ten years have paid four per cent. interest on the capital invested over and above the running expenses.

Yet, under existing circumstances, perhaps we can say that farmers have suffered in comparison to other industries—not so severely because not so accustomed to large and enormous profits. The percentage of profit may not have had so large a cut-down, because there was not so large a percentage from which to cut.

Again, agriculture may not have suffered so much in the common depression as some other branches of business, because the running capital and managing capacity have not been so concentrated. The two or three hundred thousand dollars necessary to run one of our mills, under the management of one man, would run twenty or thirty farms under the direct supervision and management of as many men who are co-workers with the employes.

We, as farmers, can boast at least that we have been able to employ the usual number of men and supply them with the necessities of life, while our mills and manufactories in many cases have allowed their men to suffer for the want of the actual necessities of life. While this county boasts of its care and interest in the working man, we, as farmers, have risen above the common depression in business, given employment to our usual number of men at very slight reduction in wages, while our mills and manufactories have not lived up to this standard in the care of their workingmen.

Ours is a noble calling, a good work, for while railroads, mechanics, manufacturers, merchants have discharged their men and cut down their wages to a large degree, thus denying them the needed allowance for their support, and while the breweries and saloons have taken in a large portion of this short allowance, it has fallen upon the men of our calling, the farmers, to supply the necessities of life to this hungry multitude and their families. These necessities, agricultural products, have, to a large degree for the last few years, been supplied at a sacrifice, because supplied at less than the actual cost of production.

Upon whom, then, does the salvation of our country, the maintenance of our families and the happiness of our people largely depend? Surely upon those engaged in the noble calling, the calling of God's own appointment—agriculture.

This was followed by an address by Prof. George A. Mitchell, of Vineland, on "Nitrogen, Phosphoric Acid and Potash—Their Use and Misuse." The speaker performed a number of experiments, showing the action of water on fertilizer ingredients and of the ingredients on the soil and on the plant.

The President of the Hunterdon County Board of Agriculture, V. R. Mathews, Esq., and Isaac W. Nicholson, President of the Camden County Board, were present and took part in the discussion, to the satisfaction of our members.

The meeting of December 4th was of unusual interest and value. After revising the report to be presented to the State Board of Agriculture, addresses were made by Dr. J. Stockton Hough, on "The Beet Sugar Industry;" Hon. J. S. Woodward, New York, on "Feed and Breed—Factors in Improving the Dairy," and by Hon. George W. McGuire, State Dairy Commissioner, on "State Milk Control."

These addresses are considered of sufficient value to other farmers to be included in this report. As heretofore, the report of the Inter-State Fair Association's work for the past year is given, although this has grown beyond the limits of the State of New Jersey, and is, as its name indicates, *Inter-State* in its exhibits, premiums and patronage, this County Board takes a lively interest in its growth, from the fact that the small beginning of which the "Inter-State" is the outgrowth started with the Mercer County Board of Agriculture in 1885, followed by the larger organization in 1888.

THE BEET SUGAR INDUSTRY.

Abstract Report of an Address by Dr. John Stockton Hough.

Napoleon I. ordered the cultivation of 100,000 acres of beets and appropriated $200,000 to foster the industry.

Under the stimulus of this bounty, this industry prospered very rapidly up to the year 1836, when 436 factories were in operation in the empire. The percentage of sugar, which in the beginning was from 4 to 7 per cent., gradually rose through improved methods of cultivation and newly-discovered chemical processes to 12½ per cent. It has been fully demonstrated that any soil that will grow a good crop of corn or potatoes is suitable for beets. The climatic or meteorological conditions are of great importance to this crop. Temperature, sunshine and rainfall exercise the most pronounced influence, not only on the yield per acre but on the degree of purity and percentage of sugar. The beet sugar belt comprises parts of the States of New York, New Jersey, Ohio, Michigan, Illinois, Minnesota, Dakota, Nebraska, California, New Mexico, Utah, Idaho, Washington and California.

New Jersey is practically wholly within this belt, which has an average temperature during June, July and August of 70 degrees Fahrenheit, and a minimum rainfall of two inches.

That the State of New Jersey is singularly well adapted to the growth of this crop may be learned from the report of the chemist of the Department of Agriculture, at Washington, from which we learn that of the twenty-four States which have this season sent beets to that department for analysis, the States of New York and New Jersey, without previous experience or preparation, this being their first or experimental year, have surpassed them all in sugar content and purity. About twenty pounds of seed are usually sown to the acre, and the average yield is about fifteen tons of beets, from which about two tons of white sugar can be extracted.

PRODUCTION AND CONSUMPTION.

The world's annual production reaches the stupendous figure of 8,000,000 tons, 5,000,000 of which are from beets and 3,000,000 from cane. The United States now produces annually about 160,000

tons of cane sugar and 40,000 tons of beet sugar; or we produce one-tenth of the amount consumed. We consume 2,000,000 tons or 4,000,000,000 pounds of sugar annually, which is about 66 pounds per capita, for which we pay the retailer the enormous sum of $220,000,000, about $100,000,000 of which is sent out of the country in gold to pay the foreign producer of the raw sugar. If we were to grow the beets here and turn them into sugar in our own factories we would have the following results:

1. We would keep $100,000,000 in gold at home.
2. We would turn 1,100,000 acres of land from potatoes, wheat and corn into the cultivation of beets, and thereby enhance the value of potatoes, wheat and corn by lessening the acreage of these crops.
3. We would require 500,000 tons of fertilizer of our own manufacture.
4. We would mine, transport and consume 2,000,000 tons of coal in excess of what we now consume.
5. We would mine, transport and consume 500,000 tons of limestone more than now mined and consumed.
6. We would distribute $75,000,000 among the farmers of this country each year.
7. We would distribute $20,000,000 among the factory labor.
8. We would distribute several million dollars for chemicals, factory supplies, cooperage, transportation and other incidentals.
9. We would require 400 sugar factories necessarily located in different parts of the country; to build, equip and run these would require the expenditure of $200,000,000 in buildings, machinery, equipment and materials incidental to the factory.
10. Assuming that we would require 15,000,000 tons of beets grown on 1,000,000 acres of land to produce the sugar we consume, we would have as by-products 500,000,000 tons of beet tops for cattle food or manure, 8,000,000 tons of wet pulp, or 2,000,000 tons of dried pulp for dried food. We should also have 1,500,000 tons of lime cake residuum, a useful and necessary fertilizer.
11. Finally the extra cultivation and subsoiling of the land cause all other subsequent crops to be more abundant and profitable without additional cost.

The beet crop of 15 tons per acre, at $5 per ton, has been shown to be three times as profitable as potatoes, and five times as profitable as wheat.

SUGAR BEETS IN THE UNITED STATES.

Since the first experiment of growth of sugar beets in the United States, made by the Beet Sugar Society of Pennsylvania, in 1836, with little result, and the practical production of 1,300 pounds of beet sugar by Mr. Childs in North Hampton, Massachusetts, in 1840, little headway was made in this industry in this country until the year 1872, when 500 tons of sugar were extracted. No essential advance was made in the quantity produced each year until 1888, when 1,910 tons were produced. From this time the industry gradually grew, until 1896, when 40,000 tons were produced.

The nine factories now in operation in this country are as follows: Chino, Watsonville and Alvarado, California; Grand Island and Norfolk, Nebraska; Eddy, New Mexico; Lehi, Utah; Menomenee, Wisconsin; Rome, New York. Others are projected, and in the course of construction, particularly in California.

Wherever these factories have been located, farmers who have once grown beets, clamor for greater acreage.

This is the only crop that the farmer grows the market value of which depends upon the chemical composition of the product, while in this case the beets must contain at least 12 per cent. of sugar, and not more than 3 per cent. of impurities. This is also the only crop which the farmer contracts for the price before it is sown, hence the greater the product the greater the profit, whereas in the case of the usual farm crops the heavier the crop the cheaper the product. The usual price per ton is $4, delivered at the factory, except where a State bounty is paid, when the farmer gets $1 additional per ton, and the factory one cent per pound more for its sugar.

The constituents taken from the soil are much the same as with potatoes.

MANUFACTURE OF SUGAR.

The usual capacity of the sugar factory is 500 tons of beets in twenty-four hours, the factory working continuously for 100 days. It is usual to estimate from one-tenth to one-eighth as the weight of sugar from a given quantity of beets. A factory of this capacity, with the necessary working capital, would cost $500,000, and would require 2,000,000 gallons of water per day of twenty-four hours.

The methods pursued in the production of beet seed shows that it requires four or five years' careful selection by analysis of "mother" beets. It would require $3,000,000 worth of beet seed per annum to raise sufficient beets to produce all the sugar we consume during one year. The seed is obtained from importers in New York in 112-pound lots at twelve and a half cents per pound, and it requires twenty pounds of seed per acre.

Nearly all those States in which sugar beet factories have been successfully established have given a bounty of one cent per pound on sugar made in the State from beets grown in the State for which the factory paid the farmer $5 per ton.

Through the operation of such a law the farmer receives one dollar more per ton for his beets than he would without the law, and the factory an equivalent sum for the sugar.

Those desiring to grow experimental patches of sugar beets, so they may be ready to grow them in larger quantities for a sugar factory next year, should grow *only* the Kleinwanzeleben and Vilmorius Improved varieties, which, experience has taught, are best adapted to our climate and soil. They should be planted or sown in rows as close together as they can be worked, say eighteen or twenty inches, and thinned out in the row to about seven or eight inches apart, in order to secure beets weighing *not more than two pounds at most*, to insure the requisite purity and sugar content, as well as tonnage, as large beets are watery and deficient in sugar. This is of the greatest importance, as we wish to prove by analysis that we can raise beets containing more than twelve per cent. of sugar, and more than eighty per cent. purity. If the weather is dry the seed may be soaked over night and dried enough in the sun to work through the planter. Those who grow the beets richest in sugar will be most sought by the factory.

Next year we expect to have a sugar factory, centrally located, on the canal and both lines of railroad, where $5 per ton will be paid for beets, if the bounty law is enacted. Not less than twenty pounds of seed should be planted per acre. This seed can be had through the writer direct from the New York importers, at twelve and a half cents per pound, 112-pound lots. A few neighbors can club together and buy a sack. By writing to the Agricultural Department at Washington, Bulletins 3 and 52 may be procured, in which all necessary information may be obtained. The seed may be put in

with a Planet Junior drill or other similar implement, not over one inch deep, the ground being well plowed, subsoiled, harrowed and rolled beforehand. No manure is to be used, unless in the fall before. Corn or truck fertilizer may be used, drilled in with a potato-planter, three inches deep in the row before seeding, at the rate of one-half ton per acre. Seed in middle of May, if possible, though up to middle of June will do, particularly if this month is not too dry. The fertilizer will give the young plants a good start, which is of the greatest importance. Work the ground as soon as the plants show, and thin when four leaves begin to appear, hoe at least twice, and *cultivate as soon as possible after every hard rain.*

Harvest, when ripe, from the first of October to the middle of November, or just before frost, if for cattle, and silo in a trench ten inches deep and six feet wide, cover with straw and earth, leaving opening for ventilation, which may be filled with straw in freezing weather. A root cellar will do as well, if one is available.

Harvest with subsoil plow, by turning clevis three inches to right side of beam and holding it there by a block of wood. Plow with this close along left side of row, when all the beets will be loosened so they can be lifted out by hand, two at a time and knocked together to free them from dirt, and then topped and thrown in piles, or carted to the stables and topped there and tops given to cows, who are very fond of them. The tops contain twice the percentage of constituents taken from the soil as the root, and are therefore a valuable fertilizer if not fed to cattle, or in the latter case, these salts are voided in the manure. In Burlington county a committee has already been named for the encouragement of beet culture, of which the Hon. H. I. Budd, of Mount Holly, is chairman, who will cheerfully give any information needed to the farmers of his county, as will the writer in Mercer county. Other counties will also name committees who will co-operate in this matter.

ECONOMICAL MILK PRODUCTION.

BY J. S. WOODWARD, NEW YORK.

Mr. Chairman and Gentlemen—By economical milk production, we mean not the production of cheap milk, but the *cheap* production of *good* milk.

In these days of close competition and low prices, it is important for the farmer to so study his business as to produce everything on his farm at the very lowest cost.

We must live from the crops of our farms, and in order to do so must make a profit in the sale or working of them up. By profit is meant the margin between what an article costs and what it sells for in the market. Consequently there are two ways of increasing profit—by increasing the selling price or by decreasing the cost of production.

I most candidly admit that I can see no roseate dawn of an era of much better prices for milk and milk products, and so I shall confine the consideration of this question to the decreasing of the cost of production.

Somebody once said, and I suppose you have heard it, once at least, "The proper study of mankind is man," but I want to say the most profitable study of the dairyman is the cow.

"Cowology" should be studied until we know just the requirement to make a quart of *good* milk for the least money. There are five factors involved in the solution of this problem—the cow, the stable, the food, the water and the care.

THE COW.

There is a wide difference between the best and poorest cow. One will eat our food and make so little milk as to steadily and rapidly run us into debt; the other will, from same amount of same food, make so much milk as to make a very satisfactory profit even at the present low prices. As an instance, two cows stood side by side in the stable at Cornell University. The one made milk at a cost of 46 cents per 100 pounds, the other cost $1.32. What we want to know is how to select the one and reject the other. Of course, there is a difference in breeds, but I am not here to discuss breeds, but, to sup-

pose you have made choice of one of the dairy breeds, try and point out the way in which to select the best cows of that breed.

If I were to give my own opinion in the matter, I should say that for a practical working, dollars and cents dairy a cross between the breeds would be more valuable than any full blood or thoroughbreds. There is something in commingling of bloods, even of men, that adds to the strength and vigor, and helps to "get there."

But, no matter what the breed may be, there are certain marked conformations of shape that show the dairy type. If we put the best cows of the different breeds, or cross breeds, side by side we shall be struck by the great similarity between them in these points.

In order that she may make much milk the cow must have a large storehouse for her food (abdomen), while she should be so wedge-shaped, both laterally and vertically, that when standing behind her you cannot see her shoulders, she must still have a good, capacious chest, so as to give lung capacity to take in an abundance of air to purify her blood and furnish heat to run the machine.

She should have a long, slim neck, tapering clear to her head—"a regular ewe neck." A head, wide between a pair of prominent, bright eyes, with a long, tapering face to a heavy muzzle and wide mouth, but her jaw should be strong. Her legs should not be over long but very slim, particularly her hind legs, which should have so little development of round as to be called "cat-hammed," and these should bow out so as to give plenty of room for a large and well-developed udder, which should be well supported by strong udder cords. Her tail should be long and slim, so as to bring the switch well down below the hocks.

From her udder there should run large, well-developed milk veins, and the openings or holes (wells), where these enter the abdominal walls, should be large. Her back should be straight or, if anything, hollowing, and the vertebræ far apart; in fact, her whole organization should be open and loose. The secretions of her skin should be copious and yellow, particularly inside her ears and up between udder and thighs.

Having a good showing in these points, with a pair of scales and Babcock milk-tester, and knowing how long she has been in lactation, we need not go far astray in choosing the cow.

THE STABLE.

Having selected the cow, we should have the stable right for her accommodation. It will no longer do to think our cow can rough it, only sheltered by a wire fence, and give most milk, and in order to know when and how to keep her it will be well to study the cow a little. We must remember this fact, all the food eaten and digested goes to one of two functions—sustaining life or production. That used in sustaining life—keeping the machine running—called *maintenance ration*, is by far the larger part—it may be all—and from this we can receive no profit. The profit must come, if it comes at all, from food eaten in excess of the maintenance ration, and which we will call the *productive ration*. It is important, therefore, that we know upon what the amount of this maintenance ration depends, or how it is used, to see if it is dependent upon such conditions as are within our control, that, if so, we may reduce the amount required to the minimum.

The cow is a warmer-blooded animal than man; 102° is her average temperature, and this must be maintained no matter what the surroundings. Now, under the most favorable conditions, at least seventy per cent. of the maintenance ration is used to keep her warm—burned up as effectually as fuel put into a stove. The more severe the cold she is compelled to endure the more food used as fuel. It follows that the warmer the surroundings the less required for keeping her warm. If, then, we would make milk most economically we must make our stables warm. But we must also remember that she requires pure air as well as warmth, so we must leave our stables well ventilated. We must also provide for plenty of light and have them dry.

It won't do to put our cows into cold, damp, dark, ill-ventilated stables, thinking that by turning the cows out an hour or so each day they will be all right. If such are our stables, by far better leave the cows out all the time. Every hour they are confined in such a stable their vitality is lowered and disease is invited; either make the stable right or leave the cows out altogether.

The balance of the maintenance ration—the three-tenths beyond the seven-tenths used as fuel—goes to digest the food or sustain exercise. If we feed an ox as much food as is given a cow of same

weight, and the ox is worked, it will show no gain—it may even grow poor. The energy which in the case of the cow would go into the milk-pail is expended in work, motion and exercise. If, then, the cow was caused to move about as much as the ox we should get no milk. The practical lesson to be drawn from this is to keep our cow just as quiet as possible, give her no more exercise than absolutely necessary for her health. We will all argue on this point; the only chance for disagreement is in determining how little exercise is necessary. I am one of those who don't believe the cow needs to go out a moment for exercise. My cows have not seen the outside of the stable since November, and they won't go out till going to pasture in spring, and I never have any sick cows. But I would never think of putting my cows into any kind of a stanchion and then keep them thus closely housed, in fact I would never be so cruel as to confine them in any kind of a stanchion for any part of the time. I fasten them either in the Bidwell stall or by a tie around the neck so they can lick themselves and lie down either side up and put their heads around in a natural, easy position, and then I am not afraid to keep them closely and continuously housed.

THE FOOD.

As has been shown, a very large proportion of the food in all cases goes as maintenance ration. In the best environments about sixteen pounds of good mixed hay or its equivalent is used for this purpose in a 1,000-pound cow. Now, if no food is given beyond this no production can take place. The cow must first be supported, and she will be in spite of us, and the production comes only from food in excess of this maintenance ration, so it is for our interest to induce her to eat and digest as much as possible beyond this.

If sixteen pounds will support the cow it can readily be seen that if she eat seventeen pounds she will be able to make a certain quantity of milk, not from the sixteen pounds, but from the one pound in excess. If now we add another pound we will double the milk, or by increasing the food only one pound we double the product. If now we give two pounds more, we again double the product, and so on to the limit of the ability of our cow to eat and digest food; so then the more food our cow can eat and digest the more milk we shall get, and the production always comes from not the first sixteen pounds, but from that in excess of this. It follows clearly that the

best cow, then, is not the one that will give most milk from *least food*, but the one that can eat the *most food and give milk in proportion to what she eats.*

We shall further find that the character of the food has much to do with the ability to digest and assimilate. To do her best she must have food adapted to the making of milk. If we analyze the milk it will be found to contain about one pound of albuminoids to four and one-half of carbohydrates, but our food must not be of as narrow a ratio, for of the food of support much the largest part is used as fuel, and this is the carbohydrate, so the ratio of food for the cow should be about one to six.

Suppose, now, we feed the cow on cornstalks, timothy hay, with corn for grain, the nutritive ratio of these would be so very wide that the cow could not eat enough to get the necessary albuminoid to form the casein of the milk for a large quantity, so the yield would be light, and if we attempted to increase the yield by increasing the food, our cow would at once begin to get fat, and this would have a natural tendency to decrease the milk flow.

Now, suppose that, on the other hand, we were feeding clover hay, wheat bran and gluten meal, we should be feeding too narrow a ration, there would not be enough of the carbohydrates to furnish fat for the milk, and the cow would absolutely take the fat from her own body to supply it until she grows poor. What is to be done then, is to so compound the ration as to furnish these elements in abundance and proper proportion.

There is an element in food that wonderfully helps digestion and assimilation, but of which the chemist cannot take cognizance—*succulence.* As an instance, about ninety pounds of the clippings of our lawn given fresh, would supply a cow each day and help her to give a nice flow of milk. Dry that same amount, as nicely as you will, and it would not support her for a great length of time; though giving no milk, succulence also adds to the palatability of foods and this has much to do with the amount the cow can eat and digest.

Having learned of what the cow's food should consist, and how to compound the ration, we next should seek these food elements in the best form and cheapest price. There can be no fixed and arbitrary value laid down to direct our purchases, as the prices vary from time to time, and we should keep posted so as to take advantage to buy the cheapest, such as will supplement what we raise on the farm.

We can often exchange something which we have raised for other products so as to make a good profit in the trade, and we should always be ready for all such trades.

A cow in full flow of milk will require not less than 2½ pounds of albuminoids, 12½ pounds of carbohydrate and one-half pound of fat per day. Of these the carbohydrate is by far the largest part, so let us see for a moment how we can get this the easiest and cheapest. Certainly not in hay, as of this she would have to eat at least thirty-three pounds, which is more than she could eat, and, besides, the hay costs too much. On an acre that would give one and a half tons of hay at least twelve and a half tons of cured silage can be grown, and we can harvest and put this in silo for but little more than it will cost to make the hay, and every two and a half tons of the silage is equal to a ton of best hay to supply the carbohydrate, so that every acre of corn grown and put into the silo would be equal to five acres of hay.

Besides this, the silage has the advantage of succulence, which adds very much to its value as stock food. It is evident, then, that as the base of our cow food for economic production, nothing can compare to corn, and in no other way can the corn be made as valuable as by putting it into the silo. Let us see: When corn is at the period of glazing it has a certain value. Let this be represented by 100; the forty-five per cent. of its value is in the ear and fifty-five per cent. in the stalk and leaves, and of the latter, sixty per cent. is in the stalk below the ear. Of these proportionate values, that in the ear is in the form of starch; that in the stalk mostly in sugar. From this time of glazing on, the changes in the stalks are all against the farmer, the sugar is changing to starch and woody fiber, and becoming less and less digestible, and thus losing feeding value. While the stalk at its best was filled with sweet juice, not a trace of the sweetness now is left. What has not been lost by the changes has been washed out, and the stalks as they now stand in New Jersey cornfields are of but little value as cow food, as compared with them when just fit for the silo.

But suppose we have plenty of the best silage as the bulk of our cow's feed and to furnish the carbohydrates, from whence shall we get that two and a half pounds of albuminoids? If feeding forty pounds of silage, the proper amount, the cow will in this get less than a half pound of albuminoids, how shall we best and cheapest furnish the balance?

Of course we want some dry food with the silage. Now suppose we were to use timothy hay for this, and to get that two pounds of albuminoids it would take at least 75 pounds to furnish it—a quantity away beyond the cow's ability to eat, and besides we can get double the quantity of albuminoids at much less expense in clover hay, so we had much better use the clover, but with a reasonable quantity of this, even as dry food, there would come only a part of the required amount of albuminoids. So in any case we must look to some of the concentrated foods for the bulk of this, but, luckily, we can get it in many of the by-products from the South and West—in wheat bran, cotton-seed meal, linseed meal, gluten meal, &c., whichever are the cheapest and most easily obtainable.

THE WATER.

We now come to that in the care of our cows which, while of the most importance, receives the least attention.

When our horses and cows stand side by side, the cow giving milk, the horse doing nothing, the rule is the horse must be watered three times a day while the cow is lucky to get water once.

No cow can do her best when thus watered. If in full flow of milk she requires from 90 to 120 pounds of water, about 15 gallons, every day. Now it is an impossibility for her to take this amount at one time.

The cow never drinks because she is thirsty. She never gets up in the morning and drinks on an empty stomach, but she drinks to keep the contents of her stomach in the best condition for rumination, and so wants to drink "a little and often." If she can have water so as to drink at will she drinks a little at least twenty times in twenty-four hours. How important, then, that she have water in her stable always accessible.

THE CARE.

We come now to the consideration of a very essential thing in cheap milk production—care. We see that the horses have a good bed and are groomed every day and kept entirely clean. All this is well—it saves feed and pays—but is there any more reason why the horse, doing nothing, should have all this care than the cow that is paying a good profit every day? Good care, clean stables, warm bed, keeping clean,

and a reasonable amount of grooming every day will pay better for the cow than the horse. She should be made as comfortable as possible, and kept in the most quiet and contented frame of mind. Any little thing that worries or disturbs her—loud talking, a stranger in the stable, milking by a strange hand—any and all these have a tendency to diminish the milk yield, and anything that does this is surely not favorable for economic milk production.

To sum up, then, get good cows, make stables hygienic in every particular, keep the cows constantly housed, feed high on well-balanced rations of succulent food, have good water always at hand, and take good care of the cows if you would make most money out of them by making good milk for least money.

STATE MILK CONTROL.

BY GEORGE W. M'GUIRE, STATE DAIRY COMMISSIONER.

When the milk law was originally passed, in 1882, the practice of adulterating milk was very common; in fact, so extensive had become the habit that the more reputable dealers sought the aid of the Legislature to break up the custom that threatened to ruin the trade in pure milk.

The first milk inspector, Dr. W. K. Newton, undertook the work with a vigor that resulted, in a few years, in placing the milk-supply of New Jersey, in point of purity, on a par with that of any other State in the Union, and after the passage of the act of 1886, when a regular corps of inspectors were appointed, the habit of adulterating milk gradually decreased, until to-day the custom has comparatively ceased.

The work of the department gradually made itself felt, not only on the dealer in milk, but the consumer began to demand a pure and unadulterated milk, and the dealer soon found himself obliged to supply it.

The inspection of milk, however, as the work progressed under the original law, owing to the interest manifested by the people, assumed a very much larger scope than that contemplated by the law, in consequence of which several laws relating to the sanitary inspection of milk and dairy premises have been enacted, and in this direction I think the future labors of the milk inspector will be demanded.

In the first place, milk, owing to its peculiar composition, containing as it does all the elements that are necessary to sustain and nourish the human life, in such proportions that make it easily digestible and an ideal food, as such should commend itself as an economical food, and one that families should freely purchase, when it is considered that, according to the market price of other foods, whole milk is far the cheapest, and contains a greater amount of actual food value.

Our chemists have repeatedly proven that this statement is correct, and I base my remarks on the results of such investigations. At a Western college comparative analyses were made of whole milk at eight cents per quart and eight cents' worth of twelve-cent round steak.

The figures obtained showed that while the same amount of protein was contained in each, the excess of the other nutrients made the milk far the cheaper. This being the case, it should be the aim of every producer of milk to place before the public an article that is not only rich in nutrition, but that is absolutely clean and wholesome. While it is true that the fat content in milk is the most valuable, yet at the same time it is the most variable, and it is not indispensable that milk shall contain such a large percentage of fat to make it a valuable food. It is considered that a milk containing four per cent. of fat, with the other elements in proportion, is an ideal food. Whole milk, however, should never contain less than three per cent. of fat.

Having seen that milk is a natural high-grade article of food, let us consider what is necessary for the producer to know, and what practices he should follow to place on the market a milk that would commend itself to the consumer, and insure him against any bad results which might occur by the use of it.

It is not only essential that milk should be rich in its nutrient value and the product of healthy cows, but there are other and equally important conditions which are necessary to insure its salutary effect upon the consumer, such as clean milkers, clean cans and vessels, clean stables, proper care in straining, rapid cooling and aeration, careful handling in preparing for market, pure water-supply, clean vehicles for transporting to market, care in delivery and collection of bottles.

When a dairyman recognizes that these conditions are necessary, not only to the production of wholesome milk, but that such a system maintained in his dairy will bring him financial success, he will become his own official inspector and exercise a care over his business that will result in the production of as pure and wholesome a milk as it is possible to make.

It should hardly be necessary for anyone to argue in favor of the milker having clean hands or that the cows should be clean, especially around the udder and their under parts, yet my experience reminds me that there is in some dairies great neglect in this respect. The owner of every dairy should insist that his employe invariably wash his hands before milking, and if he has many cows to milk to do it several times before he is through with his work, and in no case should the milker wet his hands with the milk. The under part of

the animal should be brushed and when necessary the udder wiped off with a wet or damp cloth. This practice would preclude a quantity of hair from the cow's body and particles of dirt from falling into the milk-pail.

It is equally important that all pails, cans, utensils, coolers and other vessels used in the dairy should be frequently washed and kept clean and bright, and in their construction they should be as nearly seamless as possible.

The value of this precaution can be seen when it is known that decayed milk is often found by the inspector secreted in the crevices of milk-cans, and unless they are washed immediately after being used it is almost impossible to prevent these occurrences.

Cans are much more easily cleansed if they are washed and rinsed out as soon as emptied. Luke-warm water is best for rinsing the cans, and a second washing should be done with water as hot as the hands can bear, and the use of some good soap or alkali. Next they should be thoroughly rinsed in scalding water and then exposed to the air or sunlight for several hours. If these precautions are taken such germs as result in tainted milk, or cause it to sour, would find no resting place in these vessels, and your cans and utensils would be in a fit condition to receive the milk.

An experiment made at the Wisconsin Dairy School shows the necessity of having absolutely sterilized utensils used in the dairy. Two covered cans were taken, one of which had been cleaned in the ordinary way and the other sterilized by steam for thirty minutes previous to milking. The udder of the animal was thoroughly cleaned, and special precaution taken to avoid the raising of dust; the fore-milk was also rejected. The time necessary to sour milk in the sterilized pail was twenty-eight and one-half hours, and the time required for milk in an ordinary pail was twenty-three hours.

A repetition of the experiment in winter resulted in nine hours difference in the souring period.

All the stables used for housing cattle should be kept clean, and care should be taken to see that the floors, troughs and drains are tightly jointed. They should be waterproof and the seams caulked. The walls and windows should be occasionally brushed down, the drains and troughs should be frequently cleaned, and in the fall before the cows go into the barn for the winter the inside of the barn should be whitewashed and the troughs and drains disinfected. A

suitable disinfection for drains is the chloride of lime solution, one pound to four gallons of water. A good plan to follow in whitewashing the inside of your barns is to add one pound of chloride of lime to four gallons of water in mixing the whitewash.

One of the greatest objections I find to most dairy barns is that too little attention is paid to light and ventilation, and I believe these two factors play a greater part in the spread of tuberculosis than any others. Scientific men tell us that tuberculosis is communicable from one animal to another, and that pure air and sunlight are enemies to tuberculosis germs. Therefore, in dark and poorly ventilated stables, where the rapid growth and development of disease germs take place, if it should happen that a tuberculous cow should be placed in the herd, the air of such a stable would be the means of causing the germs to spread and multiply with great rapidity, and the infection of the remaining cattle would be a sure result.

Stables should not be kept either too warm or too cold. A temperature of about 63 degrees has been found to give the best results, both as to the production of milk and the health of the animals.

Milk should be strained through at least two strainers, one of which should be cloth and should always be thoroughly washed after being used. When convenient, the straining should take place outside of the barn where the atmosphere is purer and free from dust.

An indispensable feature in the preparation of milk for the market so that it will keep well and therefore satisfy the dealer and consumer, is its rapid cooling after it has been drawn from the cow. The high temperature at which it leaves the animal greatly favors the growth of germs that gain access, even under the most favorable conditions, and the sooner it can be reduced to a low temperature the more quickly can their development be checked.

Every well-regulated dairy should possess an aerator or an aerator and cooler combined. The fact that the simple aeration of milk influences its keeping qualities is denied by many, yet all experts agree that it does add very largely to the palatability of the milk. We all know that when milk is drawn from the cow it contains certain gases which are not agreeable to the taste and a certain amount of the animal odor which it is very desirable to get rid of as soon as possible in order that the milk may have a pleasant flavor. Aerating milk is simply exposing it in a fine stream to a pure atmosphere, so as to substitute pure air for the impure air and gases in the milk. When

milk is subjected to this process in a warm condition it materially reduces its temperature and in this manner improves its keeping qualities. There are apparatus manufactured which are combined aerators and coolers and which are simple and effective. Most of you are no doubt familiar with the process of aeration, and one of the most improved aerators that I know of is arranged so as to have a stream of water passing through it while the milk covers the surface. This should always be done in a pure atmosphere and as soon after milking as possible, and there is no doubt whatever that it largely improves the keeping qualities of the milk.

I do not think any one factor exerts so potent an influence on the character of milk as its rapid aeration and cooling after milking. The value of this can hardly be overestimated.

When milk is drawn from the cow it is warm and at a temperature best adapted for the generation of bacteria. If put into cans and taken immediately for distribution it will cool slowly, and in warm weather will never become very cool. In such warm milk the bacteria which were introduced at the milking will multiply with almost inconceivable rapidity, and the milk will sour in a short time. On the other hand, if the milk is cooled artificially, immediately after it is drawn, the growth of the bacteria which have chanced to get in is promptly checked.

After the cooling, the milk may be taken for distribution, and during this time its temperature will of course be gradually rising again, if the weather is warm, but it will rise slowly, and the milk will not again become so warm as it was when first drawn. It will take several hours of even the heat of a summer day to bring the temperature back to where bacteria can grow rapidly, and by this time perhaps the milk is in the hands of the consumer, who should see that it is promptly put in a cool place. Therefore an immediate cooling will save at least several hours in the time before the souring will begin. To illustrate the truth of the above statement a striking instance was afforded by a chemist for the Dairy Commissioner some two years ago. A gentleman wrote that he had had much sickness in his family which he thought was due to the milk, but he was utterly at a loss to account for it, as the cows were kept in a perfect condition, and the breed, surroundings, &c., were of the best, so far as he knew. The farmer in charge of the gentleman's place brought a sample of the milk to the laboratory at ten o'clock in the morning. It had

been drawn at daybreak, but still retained part of its animal heat. He explained that his instructions had been always to bottle it at once and cart it immediately to the city in order that it might be used in an entirely fresh condition. The milk was of a superior quality, containing nearly 5 per cent. of fat, and nearly 15 per cent. of solids, but during the short interval of transmission the bacteria, had multiplied to 560,000, rendering the milk unwholesome and eventually poisonous.

A pure water-supply is another very important factor in the management of a dairy. The use of contaminated water has done much harm, and too little attention is paid to the location of wells, many of which are situated in a barnyard or similar place, without regard to the possible sources of contamination. Every dairyman should so construct his well that no surface water can get into it, and it should be built as far as it conveniently can from the stable or any other source of pollution.

The water of any well is purer for being frequently used, and any well can be improved by continual pumping or using water from it.

It is absolutely indispensable, in order to minimize the number of germs contained in the milk, to use boiling water for the last rinsing of the cans. In this way your vessels dry more rapidly, and no living germs are left in them. Our inspections frequently disclose conditions about a creamery or dairy, in relation to the water-supply, that are in no way conducive to the production of wholesome milk. Generally, however, they are due to carelessness on the part of the manager. I remember receiving a complaint from Jersey City, a few years ago, in reference to a number of typhoid fever cases, which had occurred on the route of a man serving milk in that city. Upon inquiry I learned that the man owned a creamery, and received his milk by railroad every day. Upon visiting the creamery I found that, during the summer, two men, who were working at the creamery, had been taken ill with a fever approaching the standard of typhoid, and subsequently a third man was taken down with typhoid fever. The first step we took was to thoroughly investigate the source of their water-supply, and without going further we found the cause of the trouble. The well was situated immediately outside of the milk-room and under the floor of the building. A room which was used for washing cans, bottles and other vessels had a floor which sloped to an open drain, about an inch wide, running the full length of the room, and the

water used for washing the vessels and a portion of the sour waste and vat-drippings flowed into this drain. An additional pipe was supposed to carry this foul water to a cesspool off from the building, instead of which the open wooden drain had rotted away and the surplus water had cut a channel through the earth into the well. A sample of the water was taken for analysis, and the chemist reported that it contained vast numbers of bacteria having the character of typhoid bacilli. He further said that he had never encountered worse nor a more dangerous well-water, and advised that its use be immediately prohibited. The well was at once filled with sand, the creamery closed for the time being, and no further trouble was reported of the milk-supply.

Every dairyman who retails his milk should have a care that his wagons are regularly cleaned and scrubbed and present a neat and tidy appearance. In dipping milk from the cans more or less will be spilled on the floor of the wagon, and unless it is washed daily it will have an odor that will have its influence on the character of the milk. No milk bottles should be collected from houses where contagious diseases exist while milk is being distributed to customers, but the collection should be done by others than those who are engaged in delivering the milk.

I am glad to say that, as a rule, Mercer county dairymen observe most of the precautions which I have named, and it is only an exception that makes it necessary for the inspector to insist on others conforming to proper sanitary modes. The neglect of proper methods in the handling and preparation of milk, however, soon makes itself felt to the dealer in milk, and unless he is watchful and careful he will be troubled with tainted milk.

It frequently happens that a dairyman applies at the office of the Dairy Commissioner for the purpose of obtaining information as to the cause of tainted milk. To all such I would say that where the cows are healthy and have proper food and access to pure water, the trouble is invariably due to some unsanitary condition of the barn or place where the milk is stored pending its transportation to market. Dr. Gerber, an eminent Swiss scientist, has classified the following causes of tainted milk, and if the rules which he has enumerated are strictly observed there will be no danger of the occurrence of this trouble:

1. Poor, decayed fodders, or irrational methods of feeding.
2. Poor, dirty water, used for drinking water or for the washing of utensils.
3. Foul air in cow stables, or the cows lying in their own dung.
4. Lack of cleanliness in milking; manure particles on udder.
5. Keeping the milk long in too warm, poorly-ventilated and dirty places.
6. Neglecting to cool the milk rapidly, directly after milking.
7. Lack of cleanliness in the care of milk, from which the greater number of milk taints arise.
8. Poor transportation facilities.
9. Sick cows, udder diseases, &c.
10. Cows being in heat.
11. Mixing fresh and old milk in the same cans.
12. Rusty tin pails and tin cans.

During the past few years a very great interest has been manifested by the medical profession and the general public in the subject of a pure milk-supply, in consequence of which, with a keen eye to the commercial success and value of extreme cleanliness and the wisdom of learning everything in the way of producing a purely sanitary milk, many individuals have undertaken, and even large companies have been formed not only in this country but in some of the large cities of Europe, to place before the consumer a milk of guaranteed quality.

We read in our daily papers advertisements of sterilized, pasteurized, certified and sanitary milk, and every thoughtful dairyman should ask, wherein are such better than mine? I know, as the State Dairy Commissioner, there exists in certain dairies in the State conditions that menace the life and health of all who drink the milk, and this without authority given to control it. If it were necessary, I could recite the most revolting details of the conditions under which milk is produced in some dairies that I have visited, making it utterly unfit for food, but time will not permit me. There is no doubt that to infected milk brought into our large cities is largely due the cause of mortality among infants, and consequently these purified preparations are recommended by physicians as a safeguard.

Happily, there are but few such dairies in our State, and none of the kind I refer to exist in Mercer county, and I know of no reason

why the milk-dealers in this county cannot compete successfully with these so-called purified milks. It is possible, by the exercise of proper care, to avoid all danger of a poor, unwholesome or impoverished milk.

When dairymen compete with each other in regard to the quality of their product, and invite the criticism of their patrons and inspection of their methods and premises, I believe success will attend their efforts, and prices will be maintained that will compensate them for the extra effort to make and place on the market a purely sanitary milk. Much of the criticism we hear about unwholesome milk should not be charged to the producer—the consumer himself is responsible for a large share of the trouble.

It frequently happens that the housewife will present an unclean dish to receive the milk, or place the milk in a closet or refrigerator where cooked and uncooked vegetables or meat are placed, and then if it becomes tainted or sour in ten or twelve hours she of course blames the milkman.

Housekeepers can do much to bring the standard of our milk-supply to perfection. They should insist upon having a clean, sweet milk delivered to them by men whose teams, wagons and utensils present a tidy appearance, and they should inform themselves as to the solid matter contained in the milk and see that it contains no preservatives, and when convenient, make a visit to the milkman's place. I believe that every dairyman furnishing milk to the city of Trenton would be only too glad to receive such a visit, and such a course on the part of the consumer would stimulate the dairyman to greater neatness and care in the handling and preparation of his milk.

Report of Board of Directors of the Inter-State Fair Association,

For the Year 1897.

Trenton, N. J., January 8th, 1898.

To the Stockholders of the Inter-State Fair Association:

Your Board of Directors respectfully submit for your consideration the following brief review of the business of the year:

The Fair of 1897 was held on September 27th, 28th, 29th, 30th and October 1st, and was, in all respects, a successful exhibition.

The attendance was as follows:

Monday	8,279
Tuesday	20,729
Wednesday	18,432
Thursday	35,329
Friday	7,699
	90,468

As compared with 1896, there was a net increase in receipts, from various sources, of $5,870.41, and a net decrease of expenses of $2,021.34.

The total amount of cash received on account of Fair was		$54,455 75
Cash paid out		45,483 77
Leaving a profit of		$8,971 98
From this amount dividends were paid on the preferred stock of	$1,400 00	
And on the common stock of	5,750 00	
		$7,150 00
Leaving a balance of		$1,821 98

To be carried into the general account.

The cash balance on hand January 9th, 1897, was $3,649.40; of this amount $3,465.63 was expended in rebuilding the track, an improvement which had become absolutely necessary. This leaves a balance in this account of $183.77, which, added to the $1,821.98, profit on the Fair of 1897, leaves the association with a present cash balance of $2,005.75.

Combining these figures in a general statement, we have the following:

ASSETS.

Real estate	$19,771 61
Buildings and improvements	141,854 98
Furniture and fixtures	6,346 06
Cash on hand	2,005 75
	$169,978 40

LIABILITIES.

Capital stock (common)	$115,000 00
Capital stock (preferred)	20,000 00
Surplus (undivided profits)	34,978 40
	$169,978 40

We congratulate you upon the resumption of dividends, and trust that with improved times and careful management the association may be able to continue them.

Respectfully submitted, by order of the Board.

JOHN GUILD MUIRHEID,
Secretary.

MIDDLESEX COUNTY.

OFFICERS FOR 1898.

President	D. R. Boice	New Brunswick.
Vice President	D. C. Lewis	Cranbury.
Secretary and Treasurer	Runyon Field	Bound Brook.

DIRECTORS.

Noah Runyon	Stelton,
David Perrine	New Brunswick.
George Smith	South River.
John B. Field	Bound Brook.
George W. Mount	Kingston.
I. D. Barclay	Cranbury.

DELEGATES TO STATE BOARD.

Runyon Field (one year)	Bound Brook.
D. C. Lewis (two years)	Cranbury.

REPORT.

BY THE SECRETARY.

The past season has been favorable to the growth of all farm crops except potatoes, which were injured early in the season by dry weather and later by the rot. The crop did not average more than two-thirds, but the price more than made up for the small yield.

The hay crop was above the average, especially clover. Wheat was also above the average—in fact, I think we have the largest average yield per acre that has been known in years—many fields averaging thirty-five bushels per acre, and some as high as forty bushels per acre. The oats crop was greatly damaged by rains at time of harvesting. Corn was about an average crop. Small fruits and vegetables are not grown to any great extent; about all that are raised are consumed in the local markets. This has been the best year, financially, that the farmers have had in several years; they have had good crops

and fair prices, still very few are making more than a good living, and you will find those that are making money taking advantage of improved methods in agriculture. They raise what crops are adapted to their soil and what their market demands.

This Board has held three meetings during the past year, and it has been our misfortune to have a rainy day for two of these meetings.

A Farmers' Institute was held at Cranbury on December 10th, and by the numbers present and the interest taken in the meeting it was shown that the farmers are interested and appreciate the work that the State Board is doing by holding these Institutes.

MONMOUTH COUNTY.

OFFICERS FOR 1898.

President.....JAMES H. BAIRD.....Marlboro.
Vice President.....HAL ALLAIRE.....Allaire.
Secretary.....D. AUG. VANDERVEER.....Freehold.
Treasurer.....J. B. CONOVER.....Freehold.

EXECUTIVE COMMITTEE.

JOHN H. DENISE.....Freehold.
WILLIAM H. REID.....Tennent.
DANIEL JONES.....Freehold.

DIRECTORS.

C. D. B. FORMAN.....Freehold.
H. V. M. DENNIS.....Freehold.
H. E. HULSHART.....Lower Squankum.
E. A. SEXSMITH.....Como.
JOHNSON TAYLOR.....Ocean Grove.
S. F. FOWLER.....Allentown.
JACOB B. CONOVER.....Manalapan.
G. W. BOWNE.....Middletown.
WILLIAM M. CONOVER.....Colt's Neck.
W. T. PARKER.....Little Silver.
PETER V. HEYER.....Matawan.
WILLIAM MORRELL.....Hazlet.
EDWARD SCHANCK.....Holmdel.
GARRET B. CONOVER.....Englishtown.

DELEGATES TO STATE BOARD.

JOHN H. DENISE (one year).....Freehold.
GEORGE L. DU BOIS (two years).....Tennent.

LEGISLATIVE COMMITTEE.

HON. D. D. DENISE.....Freehold.
H. V. M. DENNIS.....Freehold.

REPORT

BY D. AUG. VANDERVEER.

MEETINGS HELD AND TOPICS DISCUSSED.

Four meetings have been held by the Board since last report. The annual meeting was held November 21st, at which officers were elected, and an address by President C. D. B. Forman, followed by an address by Hon. J. H. Brigham, of Ohio, Master of National Grange P. of H., subject, "The New Farmer." The annual report of the Directors was also made at this meeting.

The second meeting was held March 13th, 1897. Address by Prof. E. B. Voorhees. Topic, "Growing of Apples and Pears in the State," and report of Delegate D. Jones to New Jersey State Horticultural Society.

Third meeting August 21st. Address by Prof. E. B. Voorhees. Subject, "Forage Crops; Their Growth and Feeding Value."

Fourth and annual meeting held November 20th, 1897, when officers were elected for the ensuing year. President J. H. Baird delivered his annual address. Mr. T. B. Ferry, of Ohio, addressed the meeting on "Increasing Fertility by Clover-Growing," and Mr. J. S. Woodward, of New York, spoke on the "Silo and Waste of Fodder."

Farmers' Institutes were also held under the auspices of the State Board at Freehold, December 7th and 8th, 1896; at Allentown December 4th; Keyport, December 9th and 10th, and at Keyport November, 1897.

WEATHER CONDITIONS, ETC.

The weather conditions at seeding time during the fall of 1896 were favorable to the growth of wheat and rye, much of which was sown earlier than usual, and, owing to too much growth, was in numerous instances pastured off. During the month of November fine weather prevailed, with little rain. Springs were very low. It was the warmest November here for twenty years. The first snow of the season fell on November 30th, six inches in depth. Good weather until December 16th, when there was another snowfall of fourteen inches, making

fine sleighing; cold weather the rest of December. From 1st to 17th of January, there was fine weather, followed by very cold spells with plenty of snow the rest of the winter, and up to near the 1st of April. Much plowing and planting was done early in April. A severe frost about the 20th did a great deal of damage to early vegetation. The excessive rains during May and June, with cool nights, were detrimental to the growth of corn, but benefited the grass crop. The first half of July was fine for haying and harvesting. The last half was very rainy and a great deal of grain in shock and stack was damaged, and many fields of potatoes rotted badly. The fall months were very favorable for the gathering of the corn crop and seeding to grain, which is now in fine condition.

To the farmer who makes a specialty of growing potatoes, the past year was a very profitable one; but to others who have depended on other crops or to the small-fruit grower, the past year has not been successful, financially. The last season was favorable to the increase of blight and rust. Spraying with the Bordeaux mixture did not seem to do much good on account of the frequent rains. The asparagus rust continues its destructive work, and many acres of asparagus have been taken out. The grape crop, which promised a very large yield early in the season, was almost a complete failure on account of rot. Tomatoes are largely grown in the county, both for market and canning; a larger acreage was planted than usual. The season being too wet, they did not set full, and being struck by the blight later, whole fields were destroyed.

There is an increased use of commercial fertilizers, mainly on the potato crop, with good results. The condition of live stock has not changed much during the past few years. There are several cases of hog cholera reported in the county, caused by feeding on slops from the summer boarding-houses along the shore. A few more sheep are being kept.

CROP REPORT.

Asparagus.—A light yield, owing to rust; prices fair; large quantity grown for market and canning. Some are taking out their beds on account of rust.

Corn.—Yield, 100 per cent.; price, 35 cents; quality good.

Sweet Corn.—Large quantity grown for shore trade; from 50 cents to $1 per hundred ears.

Wheat.—100 per cent.; price, 95 cents; quality good; average yield per acre, 25 bushels; highest yield, 48 bushels.

Rye.—100 per cent.; price, 42 cents; average yield, 18 bushels; highest, 36 bushels. Much rye damaged by being left in shock in the fields, by rains.

Oats.—100 per cent.; yield per acre, 40 bushels; price, 22 cents.

Hay.—100 per cent.; average per acre, 2 tons; price, $10; highest yield per acre, 3½ tons; quality good.

Crimson Clover.—An unusually fine catch the past season. Mostly grown to plow under.

Potatoes.—Average yield per acre, 30 barrels; highest per acre, 113 barrels; price, $1.75. Some of the largest growers raise from 2,000 to 3,000 barrels.

Sweet Potatoes.—Average yield per acre, 30 barrels; price $2 per barrel.

Peas.—About 600 acres grown for canning at Freehold.

Apples.—Yield good; price, $1.50 per barrel.

Pears.—80 per cent. of full crop; average price, $1.50 per barrel; most of the fruit smaller than usual.

Peaches.—Unusually large crop; quality and size very inferior, except where they were greatly thinned. The average price, 25 cents per basket for ordinary fruit. Fine fruit averaged $1 per basket. The growers lost money except those who practiced thinning.

Grapes.—Rotted badly; crop almost a complete failure; price, 1¼ cents per pound.

Strawberries.—100 per cent.; prices very low, except for the large, fancy varieties; quality poor.

Raspberries.—100 per cent.; price, 10 cents per quart.

Blackberries.—100 per cent.; price, 6 cents per quart.

Melons.—Fair yield; good prices for fine stock.

Cabbage.—Yield, 100 per cent.; price, 3½ cents each.

Tomatoes.—Yield, 25 per cent. of full crop; badly blighted; prices good.

Cranberries.—The yield for the county the past season, about 15,000 bushels.

MORRIS COUNTY.

OFFICERS FOR 1898.

President	OSCAR LINDSLEY	Green Village.
Secretary	W. F. ELY	Madison.
Treasurer	WESLEY D. HOPPING	Hanover.

BOARD OF DIRECTORS.

WILLIAM JAMES	Chatham township.
S. E. YOUNG	" "
L. J. FISH	" "
JAMES COOK	Hanover "
B. S. CONDIT	" "
S. M. HOPPING	" "
J. J. MITCHELL	" "
JOHN OLIVER	Passaic "
W. B. LINDSLEY	" "
N. D. GOBLE	" "
J. A. CASTERLINE	Dover.

DELEGATES TO STATE BOARD.

L. J. FISH (one year)	Chatham township.
OSCAR LINDSLEY (two years)	Green Village.

REPORT.

BY THE SECRETARY.

The Board has held but one meeting since the election on November 21st, 1896, which was held at Afton on February 27th, 1897, at which time the officers were elected and committee appointed to investigate the increase of taxes and suggest, if possible, where a change for the better could be made.

The chairman of this committee, W. F. Ely, gave to the Board many facts that were interesting. He called attention to the wide increase in public expenditures, both local and general, showing how the increase began in the 'sixties and had continued down to the present time. He referred to instances of extravagance and suggested that the only remedy for these evils rests with the people. Proper recognition of the services of Augustus W. Cutler was made by the Board, in the adoption of suitable resolutions.

OCEAN COUNTY.

OFFICERS FOR 1898.

President	C. M. Roree	Cassville.
Vice President	Patrick Davitt	Toms River.
Treasurer	H. R. Wills	Toms River.
Secretary	M. G. Pohl	Toms River.

DIRECTORS.

E. E. Applegate	Toms River.
I. Gibbeson	Toms River.

BUSINESS AGENT.

H. R. Wills	Toms River.

DELEGATES TO THE STATE BOARD OF AGRICULTURE.

H. R. Wills (two years)	Toms River.
M. G. Pohl (one year)	Toms River.

REPORT.

BY THE SECRETARY.

During the year 1897 the Board held five meetings, the first, December 19th, 1896, a special meeting which was called in accord to the wish of the Secretary of the State Board for the election of delegates for the State Board and Horticultural Association.

The books and accounts were examined and found correct and satisfactory.

An address by the President, urging unity and co-operation by all farmers, explaining the great necessity for it, and proving the truth of his assertion by the Board of Trade in New Egypt, and the benefits derived through it by farmers and trades people there.

February 13th the full reports of our delegates occupied the time.

April 17th the second regular meeting was held. For the first time since the organization of the Board we received a visit from the Farmers' Alliance. The Secretary of that Society gave us the pleasure of welcoming him.

A fine exhibit of winter apples decorated the table, some of the choicest being the property of Mr. P. Irons, Secretary of the Alliance. We gladly received his experiences and points how, successfully, to raise and keep this fruit, and as his words were substantiated by the samples his address interested us greatly.

Mr. P. Davitt's and Mr. H. R. Wills' selections of other varieties of apples were true samples of the adaptation of this county for the production of this fruit.

The only drawback to bring Ocean county to the front as a fruit section is the indolence of the owners of land. Thousands of acres of valuable soil lie idle while thousands of industrious hands would be glad to own and improve it.

October 9th our third regular meeting was held. The recommendation of Prof. L. Bevier, Jr., received a full share of attention, but the support of our agriculturists is of such a nature that we could not accept such movement yet.

The crop reports for the present year were made up, and another exhibition of crops just harvested lying before us, we found another proof of the productiveness of this county.

Undoubtedly the rye straw of Mr. H. R. Wills deserves special mention; length of straw from above the roots to head, six feet eleven inches; yield, thirty-eight bushels per acre.

Our fourth regular meeting was held December 11th for the purpose of election of officers.

The Secretary, who for some time had studied the question how to find new ways to increase and better our deplorable markets, explained his views. A correspondence with the Secretary of Agriculture, Hon. James Wilson, and with Prof. T. V. Coville, botanist, opened a way to procure ginseng roots. The great demand and the high prices paid for this product should not fail to arouse interest and energy. The need for greater incomes for all farmers is a fact. Will they accept something new, with necessary experiments and possible drawbacks and failures? This is to be seen.

A lengthy discourse about the Cumberland County Sweet Potato

Growers' Association followed and made the meeting very pleasant and instructive.

With sorrow the Secretary has to mention the loss of a number of the most earnest members through death, and as they were of mature age and wisdom we miss them very much. Their places cannot readily be filled by others. Out of thirty-four members, seven have gone never to return.

As to our success in farming I cannot report improvement. We have had much rain accompanied by high winds at a time when we would have been much better off without either.

Potatoes, tomatoes, melons, &c., while in bloom, were damaged so much that the crops were nearly a failure, while oats just cut received such an amount of rain, for days followed by showers, that much of it became worthless as forage.

Our salt-hay marshes, too, were flooded by high tides, much grass was washed away and other spoiled. Thus another year has passed and our hopes not realized.

The condition of our live stock is, as usual, good. The owners of horses have of late years bought a better class of such, and keep them, on an average, in good condition.

Our cows are selected more carefully, and better males are used for breeding purposes.

No creamery, dairy or cheese factory has given us the opportunity to increase the number of milch cows. Will no one take a look into such chance to improve his finances and the condition of industrious farmers?

While we hear much of hog cholera, our swine have so far not received a visit of this disease. Poultry is beginning to take a higher place, and a number of incubators are worked. Carrier pigeons are very successfully raised by a young farmer here, Mr. H. Fuhr, who does quite a good business. Many improvements have been made in Dover township. We boast of electric lights, water works, and a new $9,000 bridge; new streets have been laid out and opened, older ones much improved. We have a fire brigade, with hose and fire engine. A new island has been formed by Mr. R. Gowdy—a valuable addition to Toms River. Of late the streets have been re-named, houses numbered, and it is said free mail delivery will come next—all for Toms River. The farmers still wait for needed improvements.

Lakewood, a model town, is flourishing. The winter season has opened in due time, and the hotels are not able to accommodate all the guests. Buildings grow up in every direction; brighter and cleaner than ever the streets with their thousands of ornamental trees, luxurious buildings, surrounded by gardens and parks, and filled with carriages, riders and pedestrians, all show to the observer that money is to be had if we only try to get it.

Not less influence and business do the many summer resorts in the neighborhood of our town bring to us. Island Heights, with its expanse of water upon which boats float, loaded with joyous people; fishing schooners and yachts sail up and down the clear waters of Barnegat bay, and fishing here is worth coming to.

At Beaumont, near Mooney Island, yearly the Girard cadets spend their vacation; a camp of about 600 young soldiers and scholars romping, drilling, surveying, and frolicking at times. What more glorious time can visitors have than to see such?

Seaside Park, Barnegat Park, Bayville, Waretown, Lanoka, Forked River, and many resorts and villages, all in easy reach to visitors and inhabitants of Toms River, either by water, railroad or carriages; the beauty of this section and its healthfulness are substantiated by the ever-increasing number of summer boarders. No summer passes in which the hotels are not over-filled and guests must seek lodging and board in the neighborhood; farmers with tact, intelligence and will, can thus earn money by keeping boarders or providing for such.

An investigation of our tax-books will be made by the State Board of Taxation on the 18th of December, and as there are quite a number of unjust valuations of properties to be looked into, we have hopes of a more righteous and equal collection of taxes.

There is one great need to be adjusted. The law of the State of New Jersey demands from each county and township committee, as soon as a voting place polls six hundred or more votes, to cause the establishment of one or more such voting places; it further demands that voters shall not go farther than five miles from their residence to the place at which they exercise their elective franchise; while we have many voters which are from six to over seven miles distant and in executing their rights lose much valuable time.

The committee has been more than once notified of such law, petition has been signed by many voters, and handed to the secretary of said committee, but all is entirely ignored.

After exhausting all our means to uphold the law and cause our officers to be governed by the same law as we voters are, have failed, I beg the Secretary of the New Jersey State Board of Agriculture to accept this part of our report into the annual report, whereby our highest authority may be informed of gross negligence by our local officers, and have the law enforced as demanded.

SALEM COUNTY.

OFFICERS FOR 1897-98.

President	RICHMAN COLES	Woodstown.
Vice President	ELMER H. SMITH	Salem.
Secretary	H. C. PERRY	Friesburg.
Treasurer	REEVES FLITCRAFT	Woodstown.

DIRECTORS.

RICHMAN COLES	Woodstown.
ELMER H. SMITH	Salem.
H. C. PERRY	Friesburg.
REEVES FLITCRAFT	Woodstown.
EDWIN L. BORTON	Woodstown.
M. D. DICKINSON	Woodstown.
C. R. LOVELAND	Cohansey.
EMPSON ATKINSON	Woodstown.
B. F. STRAUGHEN	Pedricktown.
JESSIE L. COLSON	Woodstown.
M. T. M. GARRISON	Elmer.

DIRECTORS IN STATE BOARD.

HOWARD G. COOPER (one year)	Pedricktown.
RICHMAN COLES (two years)	Woodstown.

SOCIETIES REPRESENTED.

Salem County Pomona Grange, No. 6.
Woodstown Grange, No. 9.
Friesburg Grange, No. 81.
Course's Landing Grange, No. 60.
Pedricktown Grange, No. 46.
Naturalist Field Club, Woodstown.

REPORT.

BY H. C. PERRY.

At the annual meeting in Woodstown, January 27th, 1897, E. L. Borton gave a report of the twenty-fourth annual meeting of the State Board of Agriculture. Reeves Flitcraft read a paper on "The

Proper Management and Curing of Corn Fodder and Value of the Same Per Acre as Roughage for Feed." The next meeting was held in Woodstown, April 27th, when Prof. John B. Smith, State Entomologist, gave an address on the "Melon Louse." The question of sowing peas and oats for fodder was also discussed. The next and last meeting of the year was held in Friesburg, October 27th. Professor E. B. Voorhees gave an instructive address on "Making and Using Home Manures." Louis Schaible, of Shiloh, gave an interesting and practical talk on "Pear Culture," and Mrs. Phebe Lawrence read a paper on "Poultry Raising."

CONDITION OF AGRICULTURE.

Owing to larger crops and better prices for the same, agriculture in Salem county is in a more prosperous condition than last year. The leading crops grown in the county are corn, wheat and hay, and all have been good. Dairying in some form is carried on quite extensively, and large numbers of milch cows and young cattle are annually brought from New York, Ohio and Kentucky and sold to the farmers for dairy purposes. Poultry-raising is quite an industry as an adjunct to the farm, and large numbers are shipped weekly to the city markets, and make quite an income to the farmers of the county.

CROP REPORT.

Corn, although not a maximum crop, was good and much better than for several years past.

Wheat has been exceptionally good, a yield of fifty-five bushels per acre having been reported in one instance, while thirty bushels is not an uncommon yield.

Oats were a fairly good crop, but were very much injured by wet weather at time of harvest.

Hay was a good crop, much better than last year.

White potatoes were a much better crop than last year, both in quantity and quality, being almost free from scab, which has been so prevalent in some past years.

Sweet potatoes were not up to the average in quantity produced, but the price has been so much higher than last year they have been more profitable.

Fruit.—Apples have been a good crop, and more ready sale than for several years.

Pears and peaches, with the small fruits, strawberries, raspberries, blackberries, &c., are not extensively grown for market.

Tomatoes were only about half of an average crop, and were mostly engaged to the canneries at $5 to $5.50 per ton, and consequently have not been very remunerative on the whole, although in some localities they were a good crop, and when not contracted at the canneries were profitable.

SOMERSET COUNTY.

OFFICERS FOR 1898.

President	JOSEPH FITZGA	Somerville.
First Vice President	PETER W. WIKOFF	Millstone.
Secretary and Treasurer	ARTHUR P. SUTPHEN	Somerville.

DIRECTORS AND VICE PRESIDENTS.

C. MARTIN WIKOFF	Bedminster.
WM. C. LANE	North Branch.
JOHN A. LAYTON	Liberty Corner.
WM. V. LAYTON	Liberty Corner.
DR. J. D. VANDERVEER	North Branch.
LOUIS H. SCHENCK	Neshanic Station.
WM. J. LOGAN	Somerville.
JAMES J. QUICK	Somerville.
PETER J. STAATS	South Bound Brook.
ABRAM B. VOORHEES	Middlebush.
PETER SUTPHEN	Hillsborough.
THOMAS C. STRYKER	Frankfort.
S. S. VOORHEES	Blawenburg.
EARNEST C. TAGGART	Griggstown.
GEORGE W. BULLMAN	Plainfield.
A. P. VOORHEES	Plainfield.
THOMAS C. BIRD	Warrenville.
HENRY ROGERS	Plainfield.

REPRESENTATIVES TO STATE BOARD.

AMOS C. SUTPHEN (one year)	Bedminster.
EARNEST C. TAGGART (two years)	Griggstown.

REPORT

BY A. P. SUTPHEN, SECRETARY.

Somerset county was formed in 1688, by act of General Assembly, held at Perth Amboy, which act divided the county of Middlesex into two counties, setting off Somerset county. In 1694 the tax levy for Somerset was four pounds, sixteen shillings and six pence, which

was raised for "governmental purposes." The earliest record of taxing for county purposes we find is in the year 1797, when five hundred pounds was ordered to be raised by tax; in 1822, three thousand dollars; in 1847, ten thousand dollars; in 1872, seventy thousand dollars; in 1897, seventy-five thousand dollars, together with an additional appropriation of sixteen thousand dollars for county roads, making an appropriation of ninety-one thousand dollars.

We are safe in saying that during the existence of the county, more than one-third of the moneys raised for county purposes has been expended in building and repairing bridges.

This county is so situated, with the Raritan river, the North and the South Branches, the Millstone, Passaic and Lamington rivers coursing through its territory, that it is impossible to build and repair our bridges at a less cost, for a number of years at least.

With increasing population, new and more costly methods of living, new demands for public improvements, county roads, &c., there is an ever-increasing demand for money to meet these expenditures, even though it is likely to load the county with a large debt. The question is, do the people of the county—the taxpayers, the farmers—want such a debt? Are they ready for it? And this is just what this Board of Agriculture is organized for, to consider all these matters of vital interest to the farmer.

The members of the Board of Chosen Freeholders are intelligent representatives of the people and they desire the fullest expression of the farmer. How could we better aid and enlighten them with the best judgment of the farming community than through this Board?

Our meetings during the past year have been interesting and helpful. The Farmers' Institutes conducted by Secretary Dye at Harlingen and Millstone, showed, by the great number in attendance, a hearty approval. More intelligence is manifest among our farmers, and more interest observed, but our people do not seem to realize the possibilities of an organized Board.

Every interest of the farmer, the public improvements, the question of taxes, the expenditures in county and township should be considered, and as this is an agricultural county, this Board should be in touch with every county officer, if thereby the interests of the farmer can be maintained.

First find out what you want, then get together and demand it, and you are sure to have it, and how can you organize to effect cheaper than by a County Board?

The report (see statistical report by counties) on the general condition of agriculture, stock, poultry and fruit, is the average from reports kindly furnished by leading farmers in the county.

Mr. H. W. Hoagland says "Wheat and rye in this vicinity were sown later than usual, and no injury from fly noticed." Mr. Sutphen, "Wheat and rye in Bedminster sowed in usual season; fly noticed in wheat when very early sown." Mr. Amerman, "Wheat and rye sowed later than usual, and about 10 per cent. of wheat affected by fly. None noticed in rye." Mr. Bullman, "Wheat and rye sowed at usual time, and no injury noticed from fly." He further remarks, "Although some of the crops of this locality have yielded below the average, farmers have done better than for the last three or four years." Mr. Fitzga, "Wheat and rye sowed about the usual time, and no fly noticed." Also, "The increase in winter grain-sowing this fall may be credited to the better prices obtained. There is hog cholera in some localities, causing serious loss."

We have had no contagious diseases to speak of among cattle during the past year, and our large dairies are in good condition. Our peach-growers have received more money for their fruit this year, and our farmers are in rather improved condition.

Addresses were made during the year at our meetings by John M. Dalrymple, Esq., of Hopewell, on the subject of "Farm Economics;" by George A. Mitchell, M.S., of Vineland, on "Nitrogen, Phosphoric Acid and Potash; Their Use and Misuse;" by John R. Foster, of Three Bridges, on "The Oppressed Condition of the Farmer, and the Remedy;" by T. B. Terry, Esq., of Ohio, on "Increasing Fertility by Clover Growing," and "Increasing Fertility by Tillage;" by Prof. E. B. Voorhees, on "The Care and Use of Home Manures;" by Hon. Geo. W. McGuire, State Dairy Commissioner, on "The Care of Milk;" by F. E. Dawley, on "Selection of Dairy Cows," and on "Poultry Keeping;" by J. S. Woodward, on "Humus, what it is, and where did it come from?—its Necessity to Fertility," also "Feed and Breed;" by Catherine B. Lippincott, on "The Farmer's Home;" by Mrs. Valentine, on "Experience in Poultry Management for Profit;" by Geo. L. Gillingham, on "Raising Calves for Dairy Cows;" and "Five Essentials to Success in Farming," by the Secretary of the State Board.

So many addresses delivered in the county within the year, and the meetings fairly attended, incline us to believe that the farmers are awaking to their interests and possibilities.

SUSSEX COUNTY.

OFFICERS FOR 1898.

President	NELSON DEWITT	Deckertown.
Vice Presidents	THOMAS ROWE	Augusta.
	LEBEUS MARTIN	Deckertown.
Treasurer	GEORGE VANDRUFF	Deckertown.
Secretary	WILLIAM H. LEPORT	Deckertown.

DELEGATES TO STATE BOARD.—William H. Leport (two years); George Vandruff (one year).

REPORT.

BY THE SECRETARY.

We held the annual meeting of the Sussex County Board of Agriculture at Deckertown, in conjunction with the State Board of Agriculture at Farmers' Institute meeting. The weather was very unpleasant and stormy and the attendance was not large, though fair, considering the weather.

The meeting opened with a few remarks by the Secretary of the State Board, followed by addresses upon the following subjects: "Selecting Dairy Cows," by F. E. Dawley, Director New York State Farmers' Institutes; "Care of Milk," by George W. McGuire, State Dairy Commissioner; "Peach Tree Troubles," by Prof. Byron D. Halsted; "Wife's Share" and "Increasing Fertility by Clover Growing," by T. B. Terry, of Ohio.

The general condition of agriculture is somewhat better than last year, and yet the outlook for farmers, as a whole, is rather discouraging. Prices have been so low that they receive but a very small profit for their work. The past year has been one of the most productive in several years; the cold weather of the early part of the season retarded the growth somewhat, still the hay and corn crops were larger than for two or three seasons past, while rye, wheat, oats and

other grains are about the average. Potatoes and apples are an exception, being almost a total failure.

Peaches are becoming one of the chief industries of the county. The yield was the largest ever known, but not so remunerative to growers as in years before, owing to the very low prices. With the income from this, the second largest crop of the county, reduced, and the continued low price of milk—the chief industry of the county—though the market is finer, which is probably due to the recent decision of the Inter-State Commerce Commission in establishing the freight-rates, which gives the nearby farmers a small advantage and induces the dealers to buy their milk of nearby places, are far from being encouraging to the farmer.

Horse-breeding is languishing in this county, owing to the fact that they can be purchased from Western lots at such low prices that the farmer cannot afford to raise them. Mules, while used to some extent and well adapted to our hills, are not bred in this county. Small fruit and vegetable-growing is not as yet carried on to any extent, but is evidently on the increase.

UNION COUNTY.

OFFICERS FOR 1898.

President	E. P. Beebe	Elizabeth.
Vice President	G. E. Ludlow	Cranford.
Treasurer	Ogden Woodruff	Elizabeth.
Secretary	F. E. Woodruff	Cranford.

DIRECTORS.

D. G. Fink	Westfield.
J. E. Brewer	Westfield.
D. T. Magie	Lorraine.
F. E. Woodruff	Cranford.

DELEGATES TO STATE BOARD.

Ogden Woodruff (one year)	Elizabeth.
E P. Beebe (two years)	Elizabeth.

ALTERNATE.

J. E. Brewer	Westfield.

REPORT.

BY THE SECRETARY.

The Union County Board of Agriculture has held ten meetings and one picnic during the year. The attendance has averaged about ten. The meetings have been held in January, February, March, May, June, November and December. The interest manifested in the Board has been perhaps a little better than last year. The attendance has averaged about the same, but more meetings have been held and perhaps more interest taken in them than last year. Our county, surrounded as it is by Newark, Elizabeth, Plainfield and Rahway, and so near New York, is rapidly being cut up in building lots, and consequently land is increasing in value. One of the largest enterprises in our county is the building of the town of New Orange.

Three or four years ago several capitalists purchased the farm land surrounded by Cranford, Roselle, Union and Springfield, comprising about three square miles (which is held for speculative purposes), and began by cutting the woods and grading streets. The work stopped and nothing much was done for about a year; but the past year they have been quite active again, grading streets, building houses, clearing up factory sites and building a railroad which is called the New York and New Orange, and is to connect the New Jersey Central, near Roselle, with the Delaware, Lackawanna and Western, at Millburn. An immense amount of money has been spent, and it is thought that the new town will be a great boom to this section of the county.

Our roads are a great advantage to the county, and are growing in favor every day, farmers especially appreciating them because they are greatly benefited by them. They save enough wear and tear on horses and wagons, and enough time, that in a comparatively short time they pay for themselves.

PROCEEDINGS OF THE BOARD AND SUBJECTS TREATED.

The first Thursday in January we held our annual meeting and election of officers.

On January 21st a regular meeting was held, at which time Mr. Beebe, in taking up the duties of the Presidency of the Board, to which office he had been elected at the meeting preceding, thanked the members of the Board for the honor conferred upon him, and also spoke at some length upon the benefits of meetings if conducted in the proper manner, and of the condition of farming interests, &c., saying if farmers intend to compete with the world they must combine, must conduct their business on business principles, and must know the cost of production and how to produce at the least possible cost. The members were urged to do all in their power to make the Board as useful as in former years. Mr. Beebe then presented a list of subjects which might be profitably discussed by the members of the Board at future meetings.

The following questions on potato-growing were discussed: "Will Sulphur Prevent Scab?" "Is Home-Grown Seed as Good as Northern Seed?" "When is the Best Time to Market Potatoes?"

The subject for the meeting, "Marketing Produce," was then discussed. Mr. Crane stated that farmers should have better market

facilities. He thought that markets should be built at Elizabeth, Rahway and Plainfield, where farmers could sell their produce and thus not be compelled to drive to Newark; these markets to be controlled by the county and *not* by the cities. Mr. Crane then suggested two State markets, one at Jersey City the other at Camden, to be built by the State and to be controlled by the State Board of Agriculture.

This scheme was thought to be a good one in some respects, but could not be carried out at present.

President Beebe called the attention of the members to the fact that, as birds are of great value to farmers in destroying insects, they should be better protected by law from hunters. As a result, the members of the Board unanimously resolved that the present Legislature be petitioned to pass better game laws.

On February 4th a regular meeting was held, at which time two resolutions were presented and unanimously adopted. The first was in reference to better game laws, and was sent to our representatives in the Legislature. The second was to the Board of Freeholders, protesting against the use of our county roads for trolley roads.

The delegates to the State Board then read their reports, after which a vote of thanks was tendered to them.

The subject for the meeting, "Most Approved Farm Implements," was then discussed.

A regular meeting was held on February 18th. Subjects, "Fertilizers and Stable Manure" and "Hay Farming," were discussed.

It was decided that the fertility of land could be kept up by constant use of fertilizer, providing green manuring is practiced. It was also stated that farmers do not use enough lime on grass. If more were used larger crops of hay would be harvested.

The subject for the regular meeting of March 4th was, "Insect Depredations on Farm Crops." Extracts from Prof. Smith's Entomology, lately published, were read. Old and new insects and worms were the topic of discussion, and a number of remedies for their destruction given.

On March 18th a regular meeting was held, the subject being "Seeds and Fertilizers." The free seed distribution, as now carried on by the Government, was condemned. The original purpose of the distribution was to distribute new and valuable seeds among farmers, but our National Legislature often uses it to further its own ends.

Some of our standard vegetables were mentioned as being profitable for cultivation. Fertilizers were discussed at some length. The meeting adjourned until May 20th, when it was decided to hold a picnic. The Secretary was instructed to invite speakers to address those who would attend. Committees were appointed and other necessary arrangements made.

A special meeting was held on June 3d, at which time all arrangements for the picnic were completed.

On June 15th the first picnic in several years was held. Quite a large number of the members of the Board, together with their families and invited guests, were present. President Beebe gave a hearty welcome to all.

Rev. Mr. Miller, of Roselle, made a short address, speaking particularly of the high intelligence required to successfully manage a farm.

Rev. J. T. Kerr spoke of his early experience on a farm, and of the improved methods now employed in agriculture.

Mr. C. C. McBride, editor of the "Elizabeth Journal," called attention to the fact that the anti-gambling amendment was to be voted upon in September, and that everyone should vote for it. He also said that everybody wanted trolleys, but not to the destruction of county roads.

A fine exhibit of strawberries was made.

The autumn meeting was held on November 4th, at which time Mr. Ogden Woodruff read a very interesting paper on "My Trip to St. Paul to the National Farmers' Congress."

On December 2d a regular meeting was held, and the annual report on farm crops, stock, prices, &c., was made out.

CROP REPORT.

The crops of the year have not been as good as those of last year. The very cold, wet spring, the dry June and the wet July and August have had the effect of reducing the yield of many of the crops. The potato crop, upon which many depend for the largest portion of their income, was less than one-half as large as that of last year, but the high prices made good a part of the loss. Corn was also damaged by adverse weather, and only yielded a half crop. Wheat and oats also yielded about half as much as last year. Rye and hay were both good,

perhaps the largest in several years, and a considerable quantity was harvested in fine condition, but much of that cut in July was damaged by the rains and practically worthless.

The fruit crop, excepting pears, was large. During the past few years many of our pear trees have been killed by blight, and very few good trees remain in comparison with former years.

The peach crop was the largest in a number of years, but the price was exceedingly low.

Cabbages, owing to unfavorable weather, yielded a small crop.

Tomatoes were about forty per cent. of last year's crop, but prices have been higher than for several past years, and there has been a ready sale for all that came to market.

The area of winter grain sown is not as large as last year, owing to the low prices of straw and the dry weather in September and October, and the present condition is not good. No injury from the fly has been noticed.

Farm laborers, because of the increase of factory work, are on the decrease.

The raising of potatoes and milk is on the increase because of larger profits.

If farmers desire to improve their condition and advance their interests they must utilize all classes of improvements and take more interest in farmers' organizations. Good roads, lower taxes and free mail delivery (especially the latter) are the greatest needs of agriculture to-day. Although crops during the past year, with few exceptions, have been small, yet prices have been well sustained, and we think that farmers, as a rule, are a little more prosperous than they were a year ago.

WARREN COUNTY.

OFFICERS FOR 1897-98.

President	WILLIAM C. ADDIS	Delaware.
Vice President	JOHN T. OBERLY	Broadway.
Treasurer	OWEN OBERLY	Stewartsville.
Secretary	B. R. CLIFFORD	Delaware.

DIRECTORS.

LEVI KETTLE	Johnsonburg.
JOSEPH M. MACKEY	Harmony.
JAMES HILDEBRANDT	Hope.
JAMES MARLAT	Port Murray.
WILLIAM G. DUFFORD	Washington.
ALFRED SMITH	Knowlton.
EDMOND CARHART	Belvidere.
CHARLES LARSON	Montana.
R. B VANATTA	Roxburg.

DELEGATES TO STATE BOARD.

WILLIAM C. ADDIS (two years)	Delaware.
B. R. CLIFFORD (one year)	Delaware.

REPORT.

The meetings of the County Board have been more largely attended and more interest has been manifested by farmers and others interested in agriculture and horticulture than heretofore, which will increase the usefulness of this Board.

The season of 1897 opened much more favorably than 1896. Farm work was advanced during April and early part of May, when there was an excessive rainfall, which delayed late planting and produced an abundant crop of weeds, that made much more work than usual cultivating the early crops. This was followed by fair weather until haying time. Early-cut hay was gathered in fine condition,

but the later and larger part by far was badly damaged by an excessively wet spell. The balance of the year was of normal conditions and with varying results.

REPORT OF CROPS.

While the season has not been one of great prosperity, there was fair average of farm and other crops.

The wheat crop was above the average, both in straw and grain, but owing to failures of two preceding years there was a small acreage sown. The prospect for the coming year is very flattering, with price prospects good.

Rye was above an average crop, and where harvested early was in excellent condition, but those who were late lost much by the wet weather, some losing both straw and grain. This was also the case with wheat.

The hay crop was very good, clover especially so, and when cut before harvest, was in excellent condition.

The oat crop was fair, but spoiled by excessive rains.

The corn crop was above the average, and grain and fodder gathered in good condition. Many farmers are making as much of cornstalks for fodder as they do of hay, by cutting and shredding.

Potatoes were very poor, most crops being attacked by blight, followed by rot, many losing nearly all. Some say the increase of price compensated for reduced crop.

Apples were an almost total failure, and what there were, were of inferior quality and rotted very quickly.

Pears were a very fair crop and prices such as to encourage those growing or having just planted orchards, of which there are several in this county.

Peaches were an over-abundant crop, and many suffered loss instead of profit; the cause being so many shipped inferior fruit, others lost by carelessness, or something worse, through commission men. Those who sold through the exchanges were very much better off.

Those who grew strawberries, mulched heavily and left it on late, had fair crops, while those that blossomed early were baldly hurt by frost and were small.

There are but few blackberries grown; those who had, report full crop and good prices.

Raspberries were a fair crop, but many were lost by the extremely wet weather, the red ones suffering most.

Melons of both kinds were about the poorest ever grown; insects and the elements combined to destroy what is usually a large and profitable crop.

But few sweet potatoes are grown; what there were, were fine—equal to any ever grown in the county.

CELERY.

Celery-growing has assumed vast proportions and is taking lead as one of the productions of this county. Large tracts have been reclaimed on the Great Meadows, suitable for its production. And we expect soon to lead in the production of this toothsome vegetable.

LIVE STOCK.

The horse market has much improved, especially for those that are bred from Norman or Clydesdale. These find market at old-time prices, while for inferior stock there is no demand. Farmers are waking up in this matter, and the result will be profitable to all.

For cows the demand is large and prices above former years. The supply does not equal the demand. Young cattle are one of the most profitable productions at present, and prospects are favorable for a continuance of same.

Milk production is still the farmer's main business, but it seems hardly fair that he must invest in farm, stock and implements, from six to seven thousand dollars, with all other expenses, to produce and deliver milk at market, while the city dealer with a cheap outfit to deliver same receives more than half the proceeds; and yet if you want to see a farmer in a hurry to get home, just mention something about organization.

The production of pork is not profitable at present, and what is grown is slaughtered young.

The poultry business is increasing largely, and our fanciers compete with the most noted to their credit.

Those who held their sheep through the past depression are on the top wave at present. The prices are twice as high as last year, and the demand exceeds the supply.

Farm help is more plentiful, and wages are still high as compared with crop prices.

The schools of the county are of a high order, for which much credit is due to Superintendent Price, who seems to be the right man in the right place. There is still some dissatisfaction over the manner of electing trustees, as many districts are without representation.

TAXES.

There is much dissatisfaction in regard to the manner of assessments, farm property being assessed for full value, while town and personal are placed much below their real value.

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