

Document No. 38.

STATE OF NEW JERSEY.

THIRTY-FIRST ANNUAL REPORT

OF THE

State Board of Agriculture

1903..

NEW JERSEY STATE LIBRARY

To the Hon. Franklin Murphy, 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 1903.

FRANKLIN DYE,

Secretary.

Dated Trenton, November 9th, 1903.

State Board of Agriculture.

OFFICERS AND EXECUTIVE COMMITTEE FOR 1904.

PRESIDENT.

E. B. VOORHEES,New Brunswick.

VICE-PRESIDENT.

JOHN T. COX,Readington.

TREASURER.

WALTER HERITAGE,Swedesboro

SECRETARY.

FRANKLIN DYE,Trenton.

H. V. M. DENNIS,Freehold.

WILLIAM H. ROGERS,Plainfield.

JOHN M. LIPPINCOTT,Moorestown.

STATE CHEMIST.

E. B. VOORHEES, A.M.,New Brunswick.

STATE ENTOMOLOGIST.

JOHN B. SMITH, Sc.D.,New Brunswick.

MISS JESSIE V. RUE, STENOGRAPHER OF THE BOARD.

BOARD OF DIRECTORS

New Jersey State Board of Agriculture.

1904.

Term of office, one year, dating from January 1st, 1904, to December 31st, 1904, for all except County Board Directors.

CLASS A.

EMMOR ROBERTS,	Geological Survey.
JOHN E. DARNELL,	} Board of Visitors,
JOSEPH B. WARD,	
	} Agricultural College.
E. B. VOORHEES,	
	} Director of Experiment Station,
	} Professor of Agriculture.

CLASS B.

GEORGE W. F. GAUNT,	Master of State Grange, P. of H.
HENRY F. BODINE,	Secretary of State Grange, P. of H.

CLASS C.

ELIAS S. BLACK,	} State Horticultural Society.
GEORGE E. DECAMP,	
AARON ENGLE,	Burlington County Pomona Grange.
GEO. A. MITCHELL,	Cumberland County Pomona Grange.
CHARLES E. BRYER,	Centre District Pomona Grange.
WESLEY B. GILL,	Gloucester County Pomona Grange.
JOHN W. OPIE,	Hunterdon County Pomona Grange.
W. J. TINDALL,	Mercer County Pomona Grange.
EDWIN L. BORTON,	Salem County Pomona Grange.
W. C. ADDIS,	Warren County Pomona Grange.
ANDREW J. RIDER,	} American Cranberry Growers' Association.
JOSEPH EVANS,	

BOARD OF DIRECTORS.

BOARD OF DIRECTORS.

NAME.	ADDRESS.	TERM.	COUNTY.
L. H. PARKHURST,	Hammonton,	2 years,	Atlantic.
V. D. HOFMANN,	Egg Harbor City,	1 year,	"
SAM'L R. DEMAREST, JR.,	Hackensack,	2 years,	Bergen.
ABRAM C. HOLDRUM,	Westwood,	1 year,	"
ISRAEL KIRBY,	Columbus,	2 years,	Burlington.
ISAAC COLLINS,	Moorestown,	1 year,	"
C. C. STEVENSON,	Blackwood,	2 years,	Camden.
J. FRANK BREWER,	Blackwood,	1 year,	"
JOSEPH W. PINCUS,	Woodbine,	2 years,	Cape May.
E. H. PHILLIPS,	Cape May City,	1 year,	"
JOHN T. WHITAKER, ...	Fairton,	2 years,	Cumberland.
A. H. WILSON,	Vineland,	1 year,	"
AUGUST W. FUND,	Chatham,	2 years,	Essex.
FRANK GOBLE,	Chatham,	1 year,	"
JOHN TONKIN,	Glassboro,	2 years,	Gloucester.
FRANK KIRBY,	Harrisonville,	1 year,	"
JAMES LANE,	Readington,	2 years,	Hunterdon,
E. M. HEATH,	Locktown,	1 year,	"
THEODORE CUBBERLY, ...	Hamilton Square,	2 years,	Mercer.
JOHN M. DALRYMPLE, ..	Hopewell,	1 year,	"
B. DEWITT GILES,	New Market,	2 years,	Middlesex.
R. F. P. VONMINDEN, ..	New Market,	1 year,	"
D. D. DENISE,	Freehold,	2 years,	Monmouth.
C. C. HULSART,	Matawan,	1 year,	"
S. E. YOUNG,	Florham Park,	2 years,	Morris.
WM. A. LITTELL,	Whippany,	1 year,	"
C. MILTON RORER,	Cassville,	2 years,	Ocean,
CHAS. R. GRAHAM,	Red Valley,	1 year,	"
GEORGE H. KIRBY,	Woodstown,	2 years,	Salem.
EDGAR C. MOORE,	Woodstown,	1 year,	"
HUBERT PHILLIPS,	Plainfield,	2 years,	Somerset.
GEO. B. RANDOLPH,	Weston,	1 year,	"
THEODORE M. ROE,	Branchville,	2 years,	Sussex.
THOMAS C. ROE,	Augusta,	1 year,	"
JAMES L. HEADLEY,	Union,	2 years,	Union.
F. E. WOODRUFF,	Cranford,	1 year,	"
N. WARE,	Broadway,	2 years,	Warren.
SAMUEL READ,	Mount Hermon,	1 year,	"

OTHER ASSOCIATIONS.

BENJAMIN M. HAINES, Mt. Laurel Farmers' Club.
 HENRY E. HALE, Princeton Agricultural Association.
 DR. G. W. POPE, Veterinary Medical Association of New Jersey.

THE THIRTY-FIRST ANNUAL MEETING

OF THE

NEW JERSEY STATE BOARD OF AGRICULTURE

HELD AT

Trenton, N. J., January 13, 14 and 15,

1904.

REPORT OF PROCEEDINGS.

STATE BOARD OF AGRICULTURE.

Thirty-First Annual Meeting.

TRENTON, N. J., January 13th, 1904.

The Thirty-first Annual Meeting of the Board was called to order by Dr. E. B. Voorhees, President (in the chair), in the Supreme Court Room, State House, at 11 A. M., and was opened with prayer by the Rev. Walter A. Brooks, D. D.

The roll was then called by the Secretary, and the delegates answered to their names. Nearly all of the auxiliary organizations were represented.

The order of business was then presented and adopted. It is as follows:

ORDER OF BUSINESS.

WEDNESDAY.

10:00 A. M.—12:30 P. M.

Meeting of Directors (delegates) of the Board in Supreme Court Room for conference with the Executive Committee on the work of the Board.

Note—The roll of delegates will be called, and it is hoped every delegate will be present.

Meeting of State Board.

11:00 A. M.

Prayer.

Presenting Order of Business.

Minutes of Last Meeting.

Announcing of Committees appointed.

On Credentials.

On Resolutions.

On Treasurer's Accounts, and any other committees.

11:30 A. M.

Reading of the Executive Committee's Report.

Report of State Grange.

GEORGE W. F. GAUNT, W. M.

Report of Treasurer, WALTER HERITAGE.

Report of Secretary of State Board.

Introduction of Other Business.

Second Session.

2:00—5:00 P. M.

Report of Committee on Credentials.

Appointment of a Committee, consisting of one member from each county duly represented, to nominate officers for the ensuing year (the members present from each county naming their members of this Committee).

Committee will report when ready.

2:30 P. M.

Annual Address of PRESIDENT DR. EDWARD B. VOORHEES.

3:00 P. M.

Grass Production, opening with statement of Clark's Grass Method.

By DAVID M. KELSEY, Durham, Conn.

Discussion by H. W. COLLINGWOOD, Esq., Hope Farm, N. J.

4:00 P. M.

Diseases of the Potato. Illustrated. By PROF. L. R. JONES, Burlington, Vermont.

Third Session.

7:30 P. M.

"Hints on Squab Raising."

By GEORGE L. GILLINGHAM, Moorestown, N. J.

7:45 P. M.

"Useful Birds on the Farm—How to Attract and Protect Them."

By PROF. E. H. FORBUSH, Ornithologist Massachusetts State Board of Agriculture.

Note—The above lecture will be beautifully and fully illustrated with stereopticon views.

Discussion of Useful and Injurious Birds of New Jersey.

By SAMUEL N. RHOADS, Esq., Philadelphia.

Question—What restrictions, if any, shall be placed upon the Robin as a fruit destroyer?

THURSDAY.

Fourth Session.

9:30 A. M.—12:30 P. M.

Prayer.

Unfinished and New Business.

10:00 A. M.

Report of Cranberry Production in New Jersey.

By PROF. A. J. RIDER, Hammonton, N. J.

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Report of Commission on Bovine Tuberculosis.

10:30 A. M.

"Agricultural Education in Canada and its Effects."

By DR. JAMES MILLS, Director Guelph Agricultural College and Experiment Station, Guelph, Canada.

11:30 A. M.

"The Breeding of Better Horses."

By JOHN GILMER SPEED, Esq., Mendham, N. J.

Discussion opened by Mr. CLARK PETIT, Salem, N. J.

Report of Committees.

Fifth Session.

2:00—5:00 P. M.

"Dairy Management in New Jersey."

By DR. EDWARD B. VOORHEES.

3:00 P. M.

"The Dairy Situation."

By HON. W. D. HOARD, Fort Atkinson, Wisconsin.

Discussion of Breeds and Breeding, Feeds and Feeding, Management and Markets.

4:30 P. M.

Report of State Entomologist, DR. JOHN B. SMITH.

Sixth Session.

8:00 P. M. Sharp.

"Hawaii, The Country and People."

By PROF. WILLIAM LIBBEY, Princeton, N. J.

Note—This lecture will be delivered in the Auditorium of the State Normal School, and will be richly illustrated with stereopticon views.

FRIDAY.

Seventh Session.

9:30 A. M.—12:30 P. M.

Prayer.

Unfinished Business.

10:00 A. M.

"The Farmers' Institute Work in Ontario—Methods and Results."

By DR. MILLS.

10:45 A. M.

Outline of Recent Road Improvement in New Jersey.

By FRANKLIN DYE.

Some Defects in the Present System of Stone Road Construction and Subsequent Management.

By HON. HENRY I. BUDD, State Road Commissioner, JUDGE ALFRED REED, CLAYTON CONROW and others.

Resolutions and Discussions on Road Matters, Trolley Lines, Automobiles, &c.

12:00 M.

Closing the Business of the Board.

President Voorhees—The next matter is the reading of the minutes of the last meeting by Secretary Dye.

Mr. Denise—Mr. Chairman, as the minutes have already been published, I move that the reading of them be dispensed with.

The motion was adopted.

President Voorhees—I will now announce the committees appointed.

Committee on Credentials—Messrs. George E. DeCamp, of Essex county; George W. F. Gaunt, of Gloucester; and Isaac S. Crane, of Essex.

Committee on Resolutions—A. J. Rider, of Atlantic county; S. B. Ketcham, of Mercer; and E. M. Heath, of Hunterdon.

Committee on Officers' Reports—H. F. Bodine, of Hunterdon county; L. H. Parkhurst, of Atlantic; and Samuel R. Demarest, Jr., of Bergen.

Committee on Treasurer's Accounts—H. V. M. Dennis, of Monmouth county; Samuel Read, of Warren; and W. H. Rogers, of Somerset.

The Chairman—It seemed desirable on the part of the Executive Committee that there should be a committee appointed to report on our deceased members, and I announce as that committee, Dr. J. B. Ward, Mr. D. D. Denise, and Mr. C. C. Stevenson. If any member present knows of the death of any members of the Board during the past year, they should report the same to this committee.

The Executive Committee's report was then read. It is as follows:

Report of Executive Committee.

Gentlemen of the State Board of Agriculture:

Your Executive Committee, in the discharge of the duties imposed by you, have, during the past year, held seven meetings.

At the meeting February 9th, 1903, arrangements were made to transfer the books of retiring Treasurer William R. Lippincott at the next meeting, when the bond of Treasurer-elect Walter Heritage would be ready. At this meeting the Secretary

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was authorized to complete the agricultural map he had in preparation and have the same printed in the Annual Report.

Secretary expressed his desire to publish in the Thirtieth Annual Report the portraits of all the Presidents of the Board, as a memorial and perpetuation of the honorable men who have served the Board. This idea was favorably received by the committee.

The Legislative Committees of the Board and of the Horticultural Society with Professor Smith were also present at this meeting to confer as to the proposed Insect law. The bill was carefully considered, section by section, and some changes recommended, when the bill, as amended, was adopted, and the two committees requested to present it to the Legislature for enactment and to advocate its adoption.

Resolutions were introduced at this meeting, also, endorsing the report of the commissioners appointed by the Governor relating to the claims of Rutgers College against the State for payment due under the Scholarship law of 1890; this report being favorable to the claims of the College.

The Executive Committee resolved further that a copy of the report of the commissioners be sent to all the County Boards of Agriculture, together with a letter from the Secretary of this State Board urging their co-operation with us in securing the passage of Assembly Bills 78 and 79, covering this matter.

At the March meeting the material for the Thirtieth Annual Report was presented by the Secretary. He was requested to prepare and edit the same and hand it in to the Governor and the State Printing Board.

The retiring Treasurer submitted his accounts, which were audited and found to be correct, according to the vouchers, with a balance on hand of \$1.72. Treasurer-elect Heritage then filed his bond with the Executive Committee in the sum of three thousand dollars (\$3,000) which was accepted. He then assumed the duties of the Treasurership. Notice of his election to be handed the State Comptroller by the Secretary.

May 7th Prof. John B. Smith as State Entomologist was voted a nominal salary of twenty-five dollars (\$25) per month under Chapter 249, Laws of 1903, and Edgar L. Dickerson was

appointed his assistant at a salary of seventy-five dollars (\$75) per month; both terms to end October 31st.

The State Entomologist was authorized to prepare a set of rules and regulations governing the examination of nurseries and modes of procedure. A Committee of Appeal under the law was appointed, consisting of Messrs. William H. Reid, Monmouth county; Charles Collins, Burlington county, and Cyrus B. Crane, Essex county.

Appropriations were then made to the several County Boards, as per reports sent in, and to the State Horticultural Society as required by law.

At the July meeting the Secretary stated his desire to increase the interest in and the efficiency of our Farmers' Institute work. He thought it might be possible for the Executive Committee and the Board at the Annual Meeting to create a committee of co-operation in each county, consisting of the two Directors in the State Board for that county, the President and Secretary of the County Board and the Master and Secretary of the Pomona Grange, if there is one; if not the nearest local Grange or Farmers' Club. Said committee to co-operate with the Executive Committee of the State Board, through the Director of Institutes, in working up a wider interest in the local Institute, popularizing it among the farmers, suggesting topics for discussion, secure hall, distribute advertising matter, etc.

The committee were unanimous in believing some such arrangement is important and might be made very helpful. Without taking final action, the Secretary was requested to bring a plan for consideration and adoption, if approved, at next meeting.

Secretary then laid before the Committee some correspondence between Mr. Lewis T. Bryant, Secretary of the New Jersey Commissioners for the Louisiana Purchase Exposition, and himself in relation to an agricultural exhibit at said exposition, to be collected, set up and maintained by this State Board.

Your committee carefully considered the matter and decided it would not be advisable for the State Board to undertake the work of making a display of our agricultural products at St. Louis, for the reason, chiefly, that this work should have been begun

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early last spring, in order that products might have been grown and prepared especially for this purpose.

Furthermore, the committee were unanimous in the feeling that, inasmuch as the purely agricultural interests of the State were creditably shown at the Pan-American Exposition, it is no more than right that the State Horticultural Society should have an opportunity to display the pomological and horticultural products of the State at St. Louis.

New Jersey is pre-eminently a fruit and garden State, and the Executive Committee of the State Board are willing to surrender any possible claim they might have to consideration, in order to give the horticulturists an opportunity to make a display. Were it possible for us to undertake this work at this time on such a scale as its importance and the competition that will have to be met at the St. Louis Exposition demands, a different course might be pursued.

With the approval of the Executive Committee the Secretary inaugurated a sweet potato investigation, covering this industry from the seed to the marketable crop, and had engaged for this purpose Col. A. W. Pearson, Vineland, and H. O. Newcomb, Cedarville, Cumberland county, with Walter Heritage, of Swedesboro, Gloucester county. And a dairy investigation of a dairy section of Sussex county by Secretary Dickerson.

At the September meeting Secretary reported as to a plan to increase the efficiency of the Board's work in the counties, through the Directors of the State Board, the officers of the County Boards and Granges. (See circular letter sent to the directors of this Board.)

The circular letter was unanimously adopted by the committee and the Secretary was directed to notify the Directors of this Board, the officers of the County Boards and Pomona Granges of this action and to invite their co-operation.

At the October meeting Edgar L. Dickerson was appointed assistant to the State Entomologist for the ensuing year at a salary of one thousand dollars (\$1,000) per year or \$83.33 per month, beginning November 1st, 1903. The salary of the State Entomologist was fixed at \$25.00 per month for the same period.

Permission was given the State Entomologist to expend, during the coming winter, two hundred and fifty dollars (\$250) for special inspection work to clear up nursery surroundings, &c.

The President and Secretary were appointed a committee to attend the meeting of the American Association of Farmers' Institute Workers at Toronto; Vice-President Cox a committee to attend the Annual Meeting of the Pennsylvania State Board, and Messrs. Lippincott and Dye a committee to attend the Annual Meeting of the American Pomological Society in Boston.

These all to keep our Board in touch with the latest and best thought and progress connected with our industry throughout the country.

Other matters of varying importance claimed the attention of your committee, from time to time, throughout the year, details of which it is not necessary to repeat in this report, as it is all recorded in the minutes of the committee.

At our last meeting, held last evening, Secretary reported twenty-four Farmers' Institutes have been held, that the attendance had been larger than ever before and a more intelligent interest in the subjects discussed was very manifest. Members of your committee, who have attended any of these meetings, agree with our secretary that there is a growing interest in this method of agricultural education and a corresponding benefit to the agricultural industry therefrom.

Secretary referred to an article he had prepared on "History of Road Improvement in New Jersey." The committee requested him to present the same at the present Annual Meeting, with a view to its publication in the Annual Report.

The committee also appointed Dr. E. B. Voorhees a committee to attend the National Good Roads Convention at Washington, D. C., to represent this Board and State in seeking national appropriation for the building of good roads.

We now come to another Annual Meeting, the thirty-first of this Board. The past history of the Board has been marked with a steady growth, increasing usefulness and growing in public favor.

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Let us remember that the Board is constituted for the improvement of the agricultural thought and practice and thus increase the profits that should accrue from this industry. Let each officer and member endeavor always to keep our deliberations and decisions within our legitimate sphere of work. Indulging the hope that this meeting may not fall behind any of its predecessors in interest and usefulness, we submit our work as a committee with the program for your approval.

The Chairman—Gentlemen, you have heard the report of the Executive Committee, and it is your privilege to discuss it and make such recommendations as may seem proper, after which it will be referred to the Committee on Officers' Reports. That committee has been named for the purpose of taking up the matters presented by the various officers, to study them and find out whether any essential features require your attention. It seems to me important that reports of officers should be discussed in public meeting.

The report of the Executive Committee was referred to the Committee on Officers' Reports.

The report of the State Grange was then made by George W. F. Gaunt, Worthy Master. (See Report.)

The Report of the State Grange was referred to the Committee on Officers' Reports.

Mr. Heritage, the Treasurer, then read his annual report, which was accepted and referred to the Committee on Treasurer's Report. It is as follows:

REPORT OF WALTER HERITAGE, TREASURER, FOR THE FISCAL YEAR ENDING
OCTOBER 31ST, 1903.

Dr.

Total amount received from Comptroller during the year, \$4,477 39

1903.

Cr.

January 16. By Delegates' expenses to Annual Meeting, ..	\$402 30
Speakers and expenses,	448 20
Executive Committee and speakers' bill at	
Trenton House,	68 75

to the farmers? I say not. We know there has been recently a great struggle over the admission of sugar, &c., and really it has been the first opportunity the agricultural industry has had to get any benefit from the tariff, by keeping out any foreign production of sugar. Sugar has been becoming an industry in this country, and farmers in the West have been reaping some benefit from it, but that tax has been swept away, although it has been the only benefit the farmer has had from taxation.

Mr. Hoard—I want to say, Mr. President, the Secretary's report touched on one subject which I think is of almost illimitable interest to the farmer; that is the question of help. For the past two years I have been making a pretty hard study of it and I have run up against some propositions which I wonder to hear of in New Jersey. Now, the manufacturer wants help, he wants to employ labor; that is a vital proposition with him, as it is with the farmer, because no man ever got rich with one pair of hands. Consequently, he must employ labor, he must make a profit on labor; and the farmer is a manufacturer and he must employ labor. Too many farmers go on the principle of stinting themselves in the question of labor. That is one weakness. A second weakness is that, as farmers, we don't take any pains to get hold of the labor market. The farmer sits down within his line-fences and waits for labor to come along; if a man wants to hire out, he has to seek a market for his labor. The manufacturer does not do that at all, he seeks all sections where labor congregates most, and uses employment agencies, and gets hold of the matter as he best can; and if necessary, he builds houses to accommodate his labor—he does a lot of these things, which the farmer seems averse to do. I got hold of a very interesting experience from a friend in Indianapolis who was cruelly bothered with labor. He finally went to an employment agency in Indianapolis and said: "I want you to study out and see if you can't find here a lot of farm-bred men that have come over from the old country, that want employment, and who are, by environment and education, fitted to go on the farm, with some teaching and some assistance." Well, he found a large number of such people. They had drifted into Indianapolis as they do into Chicago and New York and all

these cities; they didn't know what to do with themselves, and they picked up the first thing they came to—they were digging in the streets and working in warehouses, and selling their labor the best they could. Their environments did not suit them, they wanted to get to the country, but where could they go? And the farmer sat plumb down and did nothing to assist these men nor himself. Well, the result of it was, my friend, who had a large farm, hired six of them and their families. Then he put up a little house that cost him about \$400, for each family, and he gave them about a quarter of an acre of ground, two quarts of milk a day, and an opportunity to fatten a pig or two, keep some fowls, &c. With these conditions the wife and children took hold, and he says that he never had better help in his life, and they are well contented and are getting along. But it requires a little of the power of initiation to do these things. It requires very much the same push in that direction that it does with the manufacturer; and it is true, gentlemen, that in all the cities of New Jersey and all over the country, there is a large farm-bred population that have drifted into the cities who don't know what to do to maintain themselves.

I believe if there was an organized effort on the part of the farmers of every community—an organized effort that means coming together and discussing the question and appointing committees to look after and investigate it—they would assist themselves very greatly in securing help. I want to say to you, gentlemen, with the eighty-five millions of people here and only about twelve to fifteen millions of producers of food, that the question is becoming a very serious one to the consuming population. The production of food is the great business of the farmer. Food and clothing come from the farm, entirely so. And the monopolies that succeed, as a rule, are found between the consumer and the farmer. But food and clothing constitute the great necessities of the world, and it seems to me that the farmer himself ought to organize himself, for himself.

Think of it! In France alone 600 farmers organized other bodies for their own benefit. In a similar way, Denmark one of the best countries of Europe, a vast tribe of organizations; and in the United States, every farmer standing up like a clothes-

pin, for himself alone; and he can't depend on the pinch of his neighbor at all—he will have to furnish his own pinch. There we are!

I have been working somewhat along those lines myself, as a farmer, and I have found very largely that there is no organized effort on the part of any community in the United States to take hold of these questions.

Mr. Black—Mr. President, If Mr. Hoard will come into Mercer county, he will find out that the laborer does not look for work, but the farmer is ever looking for him. He refuses to work! His wife can wash, his daughter can work in the factory, while he drinks beer and plays pool. That's the way with the colored laborer as well as the foreigner. If my friend will only come down here, he will see how active our farmers are when they want help.

Mr. Hoard—I would like to explain, Mr. Chairman, that my idea is the getting of this labor out of the cities, getting it away from the congested centers and swinging it toward the country. The difficulty to-day is that labor congests in the cities and is scarce in the country.

The Chairman—The matter of the report of the Secretary is before you, gentlemen.

A Member—I move that it be received and referred to the Committee on Officers' Reports. Carried.

Secretary Dye—In my report I referred to the sweet potato investigation, which was approved by the Executive Committee, and I would like the Board to accept the same. The investigations were made and the material furnished by Col. A. W. Pearson, Mr. Walter Heritage and Mr. H. O. Newcomb, and, in addition, an article on Diseases of the Sweet Potato, by Dr. Byron D. Halstead. I would ask that you accept this material in order that it may be embodied in the Annual Report.

A Member—I move that the report on sweet potatoes referred to be accepted, and that it be embodied in the Annual Report. Adopted.

Mr. Denise—Mr. Chairman, I move that a committee be appointed to wait on the Governor and invite him to come before the Board.

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Motion seconded and carried.

The Chairman named as the committee to wait on the Governor, Mr. D. D. Denise, Mr. Charles Collins and Mr. George E. DeCamp.

A recess was then taken until 2 o'clock P. M.

AFTERNOON SESSION.

January 13th.

The meeting was called to order by the President, who said: Gentlemen, the Secretary has a resolution to offer.

Secretary Dye—Gentlemen, I may explain the resolution is in relation to food adulteration. It is as follows:

(Resolution No. 1.)

WHEREAS, The adulteration of human foods, condiments, candies, drinks and medicines is widespread and increasing, the fraudulently prepared food alone amounting to the enormous sum of \$100,000,000 a year, ten per cent. of which is officially set down as containing "poisonous and otherwise noxious ingredients," whereby the ignorant and innocent consumer is compelled to take as food preparations containing dangerous and deleterious substances that cost him annually \$10,000,000.

WHEREAS, This nefarious business is criminal in that it robs the consumer of both health and money, the producer of pure and honest goods of his market, and the nation of large revenues from foreign countries because of such adulterations as bogus butter, filled cheese, counterfeit lard and the like, and,

WHEREAS, The National Pure Food and Drug Congress, a body composed of gentlemen of all legitimate business professions throughout the country, has for four years, at a large sacrifice of time and money, labored to perfect a bill in which they have succeeded and are substantially united; said bill having passed the House by a very large majority on December 19th, 1902, known as the Hepburn Bill H. R. 6295, and,

WHEREAS, The individual States alone cannot wholly suppress this evil; therefore,

Resolved, That the New Jersey State Board of Agriculture, assembled in Trenton January 13th, 14th and 15th, 1904, do hereby most earnestly request our Senators and Members of Congress to work and vote for the Hepburn-McCumber Bill now introduced in the Senate of the United States, in order that a beginning, at least, may be made by the National Department of Agriculture for the suppression of the evils named.

The Chairman—Gentlemen, you have heard the resolution which is offered for your consideration.

Moved and seconded that it be adopted and a copy sent to each of the Congressmen and Senators representing this State.

The Chairman—You have heard the motion. All in favor of the motion will signify the same by saying "Aye," the contrary, "No"; the Ayes have it, and it is so ordered.

The following gentlemen were then named as a Committee to Nominate Officers for the ensuing year :

V. P. Hoffman, Atlantic.

Abram C. Holdrum, Bergen.

Isaac Collins, Burlington.

J. Frank Brewer, Camden.

Dr. E. H. Phillips, Cape May.

George A. Mitchell, Cumberland.

Geo. E. DeCamp, Essex.

Frank Kirby, Gloucester.

E. M. Heath, Hunterdon.

J. M. Dalrymple, Mercer.

R. F. P. VonMinden, Middlesex.

D. D. Denise, Monmouth.

William A. Littell, Morris.

Charles M. Rorer, Ocean.

Edgar C. Moore, Salem.

Geo. B. Randolph, Somerset.

Theodore M. Roe, Sussex.

F. E. Woodruff, Union.

Samuel Reade, Warren.

The Chairman—Is there any other miscellaneous business?

Mr. Pancoast then presented several resolutions, all of which were, on motion, referred to the Committee on Resolutions:

(Resolution No. 2.)

WHEREAS, The present school law has had a thorough trial, and in townships has proved far less satisfactory and far less efficient for the improvement of rural schools than the system it supplanted;

Resolved, That we request the Legislature to abolish the Township School Boards and to place our rural schools under the old system of three trustees for each school district.

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(*Resolution No. 3.*)

(See page 48, Minutes of 1902-03.)

(*Resolution No. 4.*)

(See page 49, Minutes of 1902-03, on bribery at the polls.)

(*Resolution No. 5.*)

WHEREAS, There is reason to believe that a major portion of the personal property of the State and much of its urban real estate escape their just share of taxation, illegally and unjustly forcing rural property to bear the added burden, and to that extent depreciating its value.

Resolved, That the State Board of Agriculture appoint a committee of five to report to its next session concerning the amount of property, real and personal, that escapes assessment, and to recommend such changes in our present methods as, within practical limits, will secure a full and just assessment of all property subject to taxation.

(*Resolution No. 6.*)

WHEREAS, Many newspaper owners have attempted and may again attempt to obtain once more the profitable advertising of the laws of the preceding legislative session in their respective papers, a privilege that in the past has cost the State over \$100,000 annually; and,

WHEREAS, Such publication would be a gross waste of public money, and would tend to subsidize the press, to the inevitable injury of the public weal;

Resolved, That the State Board of Agriculture is opposed to useless and baleful waste of public funds, and requests the Legislature and the Governor to refuse to accede thereto.

(*Resolution No. 7.*)

WHEREAS, It is believed that our Executive Committee, not elected for such purposes, may not be so thoroughly qualified to perform the duties of a Legislative Committee of the State Board as men specially selected for that purpose from our whole membership; and,

WHEREAS, There is reason to believe that in the future there will be important duties for such a committee to perform;

Resolved, That the State Board of Agriculture again appoint or elect a Legislative Committee of three, who shall represent the State Board before the Legislature and the State officials, and that we again recommend the Board of each county to elect a Legislative Committee of three to co-operate with the Legislative Committee of the State Board when it so requests.

Mr. Brewer—Mr. Chairman, I have a resolution from the Camden County Board of Agriculture:

(Resolution No. 8.)

WHEREAS, In view of the great loss of life and property throughout our State occasioned by the crossing of public roads, be it

Resolved, That the Camden County Board of Agriculture request the New Jersey State Board of Agriculture to adopt such measures as may be most advisable to influence the Legislature to enact a statute that will eventually abolish grade crossings; also, be it

Resolved, That our delegate to the State Board be instructed to move this resolution and urge its adoption.

The resolutions were referred to the Committee on Resolutions.

The Chairman—The next item on the program is the Annual Address of the President.

President Voorhees then delivered his annual address (which see).

The address of the President was, on motion, received and referred to the Committee on Officers' Reports.

The Chairman—The next subject on the program is Grass Production. It seemed to the Executive Committee that this matter is of very great importance, and inasmuch as we read and hear a great deal about intensive grass culture in other States, that it would be well to have that form of culture explained. We have with us Mr. David M. Kelsey, who is quite familiar with Clark's Grass Method.

Mr. Kelsey then addressed the Board and was followed by Mr. H. W. Collingswood.

(See address on Grass Culture.)

At the close of Mr. Collingswood's address a short recess was taken, during which a canvas screen was put up for the purpose of illustrating by stereopticon views different features of Professor Jones' address.

The Chairman then introduced Professor L. R. Jones, of Burlington, Vermont, who spoke on the subject of "Blights and Fungous Diseases of the Potato," giving his experience with old and new remedies. (See address.)

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EVENING SESSION.

The meeting was called to order at 7:30 o'clock by the President, who introduced Mr. Geo. L. Gillingham, who presented a paper on "Squab Raising." (See paper.)

The Chairman—Are there any questions to ask Mr. Gillingham? If not, we will pass to the next order, which is an address on "Useful Birds on the Farm, How to Attract and Protect Them," by Professor E. H. Forbush, Ornithologist Massachusetts State Board of Agriculture. This lecture will be illustrated with stereopticon views.

(See address.)

Prof. Samuel N. Rhoads, of Philadelphia, formerly of New Jersey, was then introduced and took up the discussion of the bird question. (See address following that of Prof. Forbush.)

At the conclusion of the discussion of useful birds, and the robin as a fruit destroyer, the Board adjourned to 9:30 o'clock Thursday morning.

FOURTH SESSION.

THURSDAY, January 14th.

The meeting was called to order by President Voorhees and opened with prayer by the Rev. John B. Thompson.

The President—The first order on the program is unfinished and new business.

Mr. Mitchell—Mr. Chairman, I have a resolution to offer:

Since modern practical agriculture consists of marketing as well as producing crops, and transportation of farm produce by railroads is an essential of marketing most crops; therefore, be it

Resolved, That the farmer in his relation to the railroads should be a subject for discussion at our Farmers' Institutes. The special phase of the subject to be presented by lecturers to be determined by the Executive Committee.

The following subjects are suggested:

(1.) An exposition of the important conclusions arrived at by the Interstate Commerce Commission.

(2.) Cost of railroad construction and operation and comparison therewith of gross railroad earnings.

(3.) Comparison of this country with other countries concerning railroad service and charges.

The resolution was, on motion, referred to the Committee on Resolutions.

The Chairman—Before proceeding with the next order of business, we will have the roll called by the chairman of the Committee on Credentials.

The chairman of the Committee on Credentials, Mr. DeCamp, thereupon called the roll, and nearly all the delegates answered to their names.

The Chairman—Is there any other unfinished or new business?

Mr. C. B. Crane—Mr. Chairman; there was a part of the business last evening that seems to me as unfinished—the discussion which brought out facts in regard to the damage done to trees and fruits, which seems to me to call for action here. We are all favorable to the birds as long as they behave themselves. We like to see the robin around, and we like to see the rabbits, to a certain extent, but when they go for things which we wish to preserve, we feel the need of some protection. In view of this I have drawn up a resolution which I will offer in regard to the matter.

WHEREAS, Farmers and fruit-growers have suffered severely from the depredations of birds and animals among their fruit trees and bushes, and the game laws, as recently enacted, prohibit the fruit-grower from defending himself from their robberies; therefore,

Resolved, That the State Board of Agriculture, while it is desirous of preserving the birds for their songs and services, for the good of the farmers, nevertheless, believes that the present game laws of this State are unjust to the fruit-grower, as he should have the privilege of protecting himself from the damages done by birds and animals among his fruit trees, and we respectfully request the Legislature to so modify the present law that the fruit-grower may have the right to destroy either birds, rabbits or other noxious animals when he finds them destroying his crops.

The Chairman—You have heard the resolution, gentlemen, what is your pleasure?

A Member—Mr. Chairman, it seems to me this is a matter which is out of place at this meeting. It may be all very well and proper to come before the Horticultural Society, but there seems to me a division of sentiment about the robin, and among

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the remarks last night it was said we were protecting the fruit grower to the detriment of other branches of agriculture; and as we represent all branches, it seems to me we don't want to get up a discussion here on this subject.

The Chairman—The question is on the disposition of this resolution. The resolution was then on motion referred to the Committee on Resolutions.

Mr. Denise—Mr. President, the committee is ready to report on the nomination of officers. Your Committee on Nominations beg leave to report your present Board of Officers as the officers of this State Board for the coming year. I move the acceptance of the report and its adoption.

A Member—I second the motion. Secretary Dye put the question for the chairman and the report of the committee was unanimously adopted and the present officers were declared elected for another year.

OFFICERS AND EXECUTIVE COMMITTEE FOR 1904.

President, Edward B. Voorhees, New Brunswick.

Vice-President, John T. Cox, Readington.

Treasurer, Walter Heritage, Swedesboro.

Secretary, Franklin Dye, Trenton.

H. V. M. Dennis, Freehold; William H. Rogers, Plainfield;

John M. Lippincott, Moorestown.

State Chemist, E. B. Voorhees, A. M., New Brunswick.

State Entomologist, John B. Smith, Sc.D., New Brunswick.

Responding to the call for "speech," Vice-President Cox said: "For myself, gentlemen, I wish to say that I do feel highly honored in being continued in this position, realizing to some extent, at least, the responsibility resting on the officers of this Board. The work of the Board under its present constitution, made up as it is, devolves very largely, indeed, upon the Board of Management, the officers of the Board. The work that I have been enabled to do for you along that line has been very agreeable work for me, and afforded me considerable pleasure; and I enjoy above all things the meeting of the State Board of Agriculture. I appreciate the honor you have conferred upon me."

President Voorhees said: "There is no honor I appreciate more from the farmers of New Jersey than that of my election to represent you from year to year. I think the work we are doing in the Board is sufficient evidence of the fact that we appreciate the honors you have conferred upon us, and that we try to show by our work that we do appreciate and are doing the duties laid upon us."

The Chairman—The next order of business is the report on Cranberry Production in New Jersey, by Mr. A. J. Rider.

(See paper following report of Secretary.)

The Secretary then read the Report of the Commission on Bovine Tuberculosis. (See Report.)

In the absence of the Treasurer, Mr. Charles Howell Cook, Secretary Dye presented the Treasurer's Report. (See Report.)

The Report of the Commission was then discussed to some extent by the members and adopted. (See discussion following Report.)

The Chairman—The next question on the program is one we have frequently considered here—that of "Agricultural Education." It was my pleasure last year to visit the Agricultural College at Guelph, Ontario, Canada, and I consider it one of the most educating experiences of my life, because it showed me an agricultural college where the boys and girls get that sort of education that fits them for their future life. It gives me pleasure to introduce to you to-day Dr. Mills, the President of the Agricultural College in Ontario, an ideal agricultural college.

Dr. Mills—Mr. President, ladies and gentlemen, at the outset I have to bespeak your indulgence. I left home with a clear voice, and hoped to be able to take my part with fair credit to myself; but that hope has vanished. Coming down on the Lehigh Valley Railroad sleeping-car the steam was turned on with all force and we were almost roasted, but to relieve the difficulty the porter opened all the ventilators overhead on that cold winter night, and so I took cold and am so hoarse I fear I shall not be able to interest you at all.

Now, I am glad to see Dr. Voorhees here in the chair, as President of your State Board of Agriculture—a man whom we regard as an able, progressive and very successful worker and

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educator; a man who has done a great deal already to advance the interests of agriculture and agricultural education in this State and elsewhere in the country. I am glad to be here in the presence of an audience of representative farmers of the State of New Jersey. I believe you are delegates from your respective districts. The only thing more I would like to have is 200 or 300 of the rank and file of your farmers here. It is, however, a little difficult to get to meetings of this kind the class of men you wish to reach, the men most in need of the papers and the discussions which you have at these meetings. I suppose most of you are real farmers—I mean not gentlemen farmers—men who make their money somewhere else and spend it on the farm, but real, genuine, true-blue farmers. I hope so.

Dr. Mills then read his paper on Agricultural Education. (Which see.)

At the close of the address President Voorhees said: We have certainly heard a very interesting and instructive address, and one that should certainly be helpful to all of us.

A vote of thanks was given to Dr. Mills for his valuable address.

Mr. Hoard—Mr. President, I would like to know what we would have had if Dr. Mills had been quite in order.

The Chairman—The next subject on the program is "The Breeding of Better Horses," a matter which is of very great interest to us in this State, and we have with us to-day a gentleman eminently qualified to discuss this question in all its various branches, and particularly from the farmers' standpoint. I have great pleasure in introducing Mr. John Gilmer Speed, of Mendham, New Jersey. (See paper.)

At the close of Mr. Speed's address the Board took recess until two o'clock P. M.

FIFTH SESSION.

After Recess, 2 P. M.

Secretary Dye—In the absence of the Vice-President I will call the meeting to order, and it gives me great pleasure to introduce Dr. Edward B. Voorhees, President of the New Jersey

State Board of Agriculture, who will now address you on the subject of "Dairy Management in New Jersey."

Dr. Voorhees—I am very glad, gentlemen, to be present at this time. This paper is supposed to be a sort of prelude and introduction to the better one that will follow by the Hon. W. D. Hoard, of Wisconsin. While a good many of the matters I shall present are perhaps familiar to the farmers of this State, nevertheless, as was pointed out in one of the preceding lectures, it is very well for us to emphasize and repeat to ourselves those things we know, in order that we may get courage enough to do them. (See Paper.)

Secretary Dye—Gentlemen, you have heard this excellent address by Dr. Voorhees; do you wish to ask any questions? (See questions and answers following the address.)

A vote of thanks was extended to Dr. Voorhees for his able address.

President Voorhees—I have the pleasure of introducing at this time ex-Governor Hoard, of Wisconsin. He is the originator of the best we have in dairying at the present time, and I commend his paper to your careful consideration.

Mr. Hoard then addressed the Board on "The Dairy Situation." (See address.)

A vote of thanks was extended Governor Hoard for his very instructive address.

The Chairman—The next business is the report of the State Entomologist, Dr. John B. Smith. (See Report.)

Chairman Cox—It would be proper to have a motion to receive this report so it may become a part of the record.

Secretary Dye—I desire to make a motion to receive, with the idea of printing in the Annual Report, the following Papers and Reports:

Annual Address of President Dr. Edward B. Voorhees.

Grass Production, by Mr. David M. Kelsey and H. W. Collingwood.

Discussion of Blights and Fungous Diseases of Trees, Vegetables and Plants.

Hints on Squab Raising.

Useful Birds on the Farm, by Professor E. H. Forbush.

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Report of Cranberry Production in New Jersey, by Professor A. J. Rider.

Agricultural Education in Canada and its Effects, by Dr. James Mills.

The Breeding of Better Horses, by Mr. John Gilmer Speed.

Dairy Management in New Jersey, by Dr. Edward B. Voorhees.

Report of State Entomologist, by Dr. John B. Smith.

None of them have been formally received, and I move that they be received to be printed in the Annual Report.

The motion being seconded.

The Chairman—It has been moved and seconded that the papers and addresses named be received to be printed in the Annual Report. All in favor of that motion signify the same by saying "Aye," contrary "No"; the "Ayes" have it; and it is so ordered.

Mr. Denise—Mr. Chairman, there was a committee appointed yesterday to invite the Governor to come before the Board. I have been to his office two or three times to find him, but he has not been there. The committee was discharged.

The Board then took recess till 8 P. M., then to meet in the auditorium of the State Normal School.

EVENING SESSION.

At 8 o'clock P. M. the Board met in the auditorium of the State Normal School. There were present also several hundred of the pupils of the State Schools and a number of teachers.

The address of the evening was made by Prof. William Libbey, of Princeton, on "Hawaii, the Country and People," and was illustrated with numerous views on a canvas by the stereopticon.

THIRD DAY—SEVENTH SESSION.

January 15th, 1904.

Called to order by the President.

The Secretary then read the report of the Committee on the Treasurer's Accounts, as follows:

The Committee on Treasurer's Accounts report that they have examined all the accounts of the Treasurer, and compared the same with the vouchers, and find them correct.

H. V. M. DENNIS,
W. H. ROGERS,
SAMUEL READ,
Committee.

The report was, on motion, received and adopted.

Mr. Demarest submitted the report of the Committee on Officers' Reports.

Report was received.

Dr. Ward—The Committee on Memorials would report that they have considered the matter of the number of deceased members, and without drafting a resolution in a very hasty manner, they requested permission to submit it to the Executive Committee at a later date, so that it may be published in the proceedings.

Request of the committee was granted.

COMMITTEE ON RESOLUTIONS.

Mr. Rider, chairman of Committee on Resolutions, reported the resolutions referred to the Committee as follows:

The first resolution before the committee (No. 2) is the one relating to a change in the system of our public schools. While the committee sympathizes with the resolution, believing that the present law has worked disadvantageously to the rural district or schools, especially by taking from them the privilege of managing their own school affairs which is in and of itself an important educational factor in the neighborhood, still we are of opinion that it would be unwise to make another change in the

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school laws at the present time. The resolution is reported adversely.

After an extended discussion the report of the committee was concurred in.

Mr. Rider—The Committee report adversely Resolution No. 3. Moved and seconded that the report be concurred in.

Mr. Rider—I wish to say that the result reached on every resolution that has been acted upon by the committee has been by the unanimous vote of the committee. In regard to this matter of printing all resolutions presented to the Board of Agriculture, the committee do not deem it wise to put on record such resolutions, from the fact that the Board of Agriculture has an Executive Committee that revises all work before it goes to the printer, and there is also a State Printing Board. I wish to say further, that we have chronic kickers in our part of the State, and if they found that we had such a rule as that, they would fill that book with resolutions. (Laughter.)

The committee's report was then adopted.

Resolution No. 4 the committee reports without recommendation.

A motion to have the resolution again read was laid on the table.

Resolution No. 5 on the subject of Taxation. The committee report this adversely, as not practicable. The reason for its impracticability is the enormous expenditure that would be involved by the Board of Agriculture in undertaking such an investigation, and for the second reason such an investigation would require a body which had no power to summon witnesses. This committee would not have that power.

Moved and seconded that the report of the committee be concurred in.

After an extended debate a vote was taken on the motion to concur in the committee's report, which was carried.

Mr. Rider—The next resolution is No. 6, which has reference to the publication of the laws in the newspapers. The committee have carefully considered this matter and they find that the Legislature does not publish the laws at the expense of the State in the newspapers, and they have no reason to think they

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will return to the old plan. therefore this resolution is entirely premature, as there is no bill before the Legislature proposing the change. We report it adversely.

Moved and seconded that the report be concurred in.

After some discussion the motion to concur in the report of the committee was adopted.

Resolution No. 7, concerning a Legislative Committee. The Board of Agriculture already has a Legislative Committee. We report adversely.

Moved and seconded that the report be concurred in. Carried.

RESOLUTION OF CAMDEN COUNTY BOARD OF AGRICULTURE, ADOPTED NOVEMBER 30TH, 1903.

WHEREAS, In view of the great loss of life and property throughout our State occasioned by the crossing of public roads by steam railroads at grade, be it

Resolved, That the Camden County Board of Agriculture request the New Jersey State Board of Agriculture to adopt such measures as may be most advisable to influence the Legislature to enact a statute that will eventually abolish the grade crossing, *or provide suitable gates or watchmen*; also, be it

Resolved, That our delegates to the State Board be instructed to present this resolution and urge its adoption.

Attest : DANIEL W. HORNER,
Secretary Camden County Board of Agriculture.

Resolution No. 8. This resolution is in reference to railroad grade-crossings. It was presented by the Camden County Board of Agriculture, and the resolution is reported with an amendment which simply provides that grade crossings shall be abolished, *or that suitable gates or watchmen be provided at such crossings*. The resolution is reported with that amendment.

Moved and seconded that the report be concurred in. Motion carried, and resolution as amended adopted.

Resolution No. 9. This resolution has reference to the employment of persons specifically for the conduct of local Farmers' Institutes. The committee regard this as a sort of an invasion upon the rights of the Executive Committee of the State Board, which decides the subjects to be discussed and the speakers who shall be employed. The committee report this adversely.

The report was concurred in.

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Resolution No. 10. The last resolution before the committee is that concerning the destruction of robins where they are destroying fruit, &c. The committee think it can do no harm and report it favorably.

Moved and seconded that the report of the Committee be concurred in.

After an extended discussion Mr. John T. Cox moved a substitute resolution, as follows:

Resolved, That the game laws be so amended as to require the game wardens of the various counties in the State to issue permits, in proper cases, allowing the farmers, fruit-growers and nurserymen in their respective counties to kill or destroy rabbits, squirrels or robins when found injuring or destroying their trees, plants or fruits upon their own premises only.

The motion was then put on the substitute, which was accepted and adopted.

Moved, by Mr. Pancoast, that the resolutions which have been defeated before this Board appear in the proceedings of this annual session. Motion seconded.

Moved, by Mr. Denise, that the resolution be laid on the table. Motion seconded and carried.

The President—We will now take up the regular program. We have Dr. Mills with us and he will give us a talk on "Farmer's Institute Work in Ontario."

Dr. Mills then delivered a very acceptable address, at the conclusion of which a vote of thanks was given him by the Board. (See address.)

Mr. DeCamp—The Committee on Credentials report all the organizations represented that are entitled to representation, with the full number of delegates.

The President—We will proceed to the next order of business, which is "Outline of Recent Road Improvement in New Jersey," by the Secretary, Franklin Dye.

Secretary Dye then read a paper on the subject stated, which was followed by Hon. Henry I. Budd, on "The Growth of Road Improvement in this and other Countries," when a general discussion of present requirements was participated in. The discussion was opened by Clayton Conrow, of Burlington county,

who was one of the pioneer workers for better roads. After the discussion the Board adjourned.

Outline of Road Improvement in New Jersey.

[The object of this paper is to show and record some of the leading features of road legislation and road construction in New Jersey, the events and persons prominent in the later progress made, the character of the legislation whereby stone road construction by State aid has been made possible, and to further incite the pride and ambition of our citizens to such action as will improve and beautify our entire system of public highways.]

Public highways are one of the necessities of a civilized people. Their chief object is, or should be, to expedite travel and facilitate the transportation of freight to its destination. Most of our primitive roads were but a strip of land set apart for public use and fenced in on either side, over which (and *through* which at certain seasons of the year) the traveler might go if he could to his objective point.

As population increased and towns and cities multiplied, a new and increasing demand for farm produce was created, and the farmer found it to his advantage to market his produce in those business centres, even though a portion of it must be "traded out" for various dry goods, groceries, &c., in order to make a deal with the merchant.

At the same time farms were increasing in number. Farming was the chief general business, and the State Legislature was appealed to for some enactment looking to the betterment of the public highways. This agitation resulted in the enactment of laws many and various; so that down to 1886 there were fifty-seven general acts of the Legislature relating exclusively to roads.

In addition to those, there were a large number of special township acts regulating the management and care of roads in the particular townships to which such acts applied, and numerous provisions in sundry general acts that directly or indirectly affected the laws governing the roads.

The roads once laid out were entrusted to the care of road overseers, road commissioners, roads boards and the like. An early and prominent official was the road overseer. In most

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cases these were elected at the annual town meeting by the legal voters who were empowered by law to elect "as many overseers of the highways as they shall deem necessary or convenient." (Laws of 1798.)

Other townships were divided into road districts, and the voters therein would elect *their* overseer at a special district meeting called for that purpose. And there were still others where road commissioners were elected at the town meeting. These had supervisory powers over the road overseers.

"A general act concerning roads," passed by the General Assembly of the Province of New Jersey in 1774, vested every road overseer with the power to call out the able-bodied inhabitants of his district to work upon the roads, and enforced obedience to such call by the imposition of fines upon those who failed to respond. This method became known as the labor method. Between 1774 and 1798, a number of townships obtained special acts authorizing them to raise a road tax, which, when collected, was paid over to the road overseers, and by them expended in hiring men to work upon the roads. This method became known as the hire method.

"In 1798 the Legislature passed a new general act, prepared by Governor Patterson, repealing all special township acts that had been theretofore enacted, and providing that townships generally might adopt either the method of repairing roads by labor or by hire. In 1818 the road law was again revised, in which the methods of repairing roads, either by labor or by hire, were preserved; but as some townships which, under the prior act of 1798, had chosen to maintain their roads by hire had failed to raise a sufficient tax to enable overseers to keep their roads in a proper state of repair, an additional provision, intended to remedy this defect in the act of 1798, was inserted in the act of 1818, making it the duty of the overseer, when not supplied with sufficient funds properly to repair the roads of his district, after having expended the funds placed at his command to resort to the labor method and warn out the inhabitants to work. This combined labor and hire system, perfected in 1818, is exactly the system provided by the general road law of 1886."*

*Extract from Lanning on "Care of Roads"—State Board of Agriculture, 1886.

Under this much-subdivided and patch-work system of working the roads there was expended in some years nearly a half million dollars, and this sum was paid mostly by the farmers. The worst feature of the system was that the roads were as much in need of repairing the next spring as they were at the beginning of the preceding year and the people were not satisfied. There was a growing demand for better roads.

This demand was met, in part, by the building of turnpike roads. Laws were enacted, from time to time, chartering companies to build such roads and fixing the rates of toll thereon. Their right of way was usually secured on roads having the greatest amount of travel, and when made they were usually in better condition than the common roads. They showed very plainly the possibilities of quicker and easier travel, and with heavier loads than was possible over the other roads. Although the turnpikes answered a good purpose for a time, they were not wholly satisfactory.

Meanwhile the State Board of Agriculture, which was organized in 1872, and composed of some of the most intelligent and progressive farmers of the State, began to investigate the road laws, and committees were appointed year after year to consider some phase of the question with a view to making such recommendations as might lead to the more permanent improvement of the roads.

One of the first results of this research was that Judge William M. Lanning, now Member of Congress, was requested to prepare a paper on the road system of the State with such suggestions as he might consider beneficial if adopted. This paper will be found in the Report of the State Board of Agriculture for 1886.

At the Annual Meeting the following year, 1887, the Board discussed Mr. Lanning's recommendations at length, adopting some, amending others; when the whole matter was referred to a committee consisting of: Elwood Evans, Charles Collins, W. S. Combs, Henry C. Kelsey, Aug. W. Cutler, Joseph B. Ward, Abram W. Duryea.

This committee was to formulate a bill and submit it to the

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Executive Committee and, if they approved it, they were to present it to the Legislature for enactment.

The committee at the next Annual Meeting reported a bill (see page 64, Report of 1888-89). Its main features were: It placed the management of the roads in the hands of the township committee. They could appoint superintendents to make and repair the roads, could procure machinery, implements, stone, gravel and hire laborers. Could borrow money on the credit of the township to a certain amount—the road tax, when collected, to repay such loan.

All taxes for roads to be paid in money and paid over to the township treasurer and paid out only on the warrant of the town committee. It made provision for building certain roads partly by contribution of property owners and partly by tax. Regulated the planting and cutting of trees along the highway—constructing sidewalks, &c. This bill was intended to abolish the road overseer system as such. As might be expected, it met with active opposition by those who would be officially affected by its provisions. Notwithstanding this influence, it finally received the sanction of the Legislature and the approval of Governor Abbett, becoming the law of the State in 1891.

The continued discussion of the road question in the State Board created a wide interest in the subject of road improvement. In December, 1888, the writer, then Secretary of the State Board, was invited to address the Morris County Board of Agriculture on the road question. This address, delivered at Afton, endeavored to approximate the annual loss to New Jersey farmers in teams, wagons, harness, time, &c., occasioned by bad roads. It is printed in the Annual Report of that year in the Morris County Report.

Soon after the above meeting, your Secretary was invited to attend a conference in the Court House at Elizabeth, Union county, held for the purpose of drafting a law whereby the counties could issue bonds for road purposes. This movement was headed by Messrs. Frank Bergen, William T. West, A. B. Carlton and Senator Miller, of said county. Following

this meeting Mr. Bergen drew up a bill, which became known as the "Union County Law."

Through the efforts of Senator Miller, in the Senate, and Hon. Foster M. Voorhees, in the House, who was then a member, the bill was passed by both Houses. The measure was a radical change from the old system and required skilled tactics and persistent work to secure its enactment. But it was done. Under this law, Union county went to work heroically borrowing money and building roads. And it should be said to the honor of the Union County Board of Freeholders, all moneys secured for road building, under this law, were honestly expended for improving the roads. The construction of better roads throughout the State received a strong impetus from the example set by Union county.

Many years prior to the last-named law, it should be stated that Essex county, under a special law, had built many miles of telford and macadam roads; many of them broad and attractive, well suited to a section so densely populated, and with so much travel incident to the business of large cities and growing towns.

STATE AID PROPOSED.

Coming down to 1891, we find the Road Committee of the State Board of Agriculture continued and holding meetings for the consideration of this subject. The committee, at this time, consisted of Silas Betts, Clayton Conrow, B. E. Tine, Abram W. Duryea, B. S. Condit, Dr. Joseph B. Ward. From the minutes of a meeting of this committee, held February 9th, 1891, there occurs this proposition by Clayton Conrow: "Mr. Conrow suggested a method for building roads whereby the funds could be raised as follows: The State to pay 33 per cent., the county 33 per cent., the townships 24 per cent., and the property owners adjoining the highways, 10 per cent and 5 per cent. on the land on either side. The several materials, afterward used in the construction of such roads, were named and discussed by this committee.

The Executive Committee of the State Board then authorized their road committee to employ Judge William M. Lanning to

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draft outline of bill as suggested by the committee. The bill was drawn and a conference arranged with Governor Abbett as to its provisions. His suggestions, owing to his position, were imperative and a new bill was drawn, which did not, however, annul the State Aid feature; although it limited it to \$20,000 per annum from the State. But, when the bill became a law, it provided for an expenditure from the State of \$75,000 a year as urged by the Executive Committee of the State Board and the road committee.

Although this law was enacted in 1891, it did not become operative until 1892, for reasons not necessary to relate here. To cease from further effort at this point might result in ultimate failure. Accordingly, your Secretary proposed to the Executive Committee that a State Road Convention be called to follow the Annual Meeting of the Board in January, 1892. The committee approved, the meeting was called, and, after the complimentary remarks of the then President Edward Burrough, who was elected Chairman of the Convention, the Secretary said: "I would state that the idea of a State Road Convention occurred to me several months ago, and was approved by the Executive Committee. Correspondence was thereupon opened with leading gentlemen throughout the State, all of whom approved the plan. It was the intention to have a Road Convention composed of citizens from all parts of the State to consider this great subject.

"The State Board has discussed the question for several years, and has taken a deep interest in the matter, but we feel the need of the co-operation of other gentlemen throughout the State. We have been trying to stir up an interest in road improvement, and others have been trying to do the same thing, and we felt there should be a union of these different forces, and by this concentrated energy we could, perhaps, bring about a better system of road-making in New Jersey.

"We in New Jersey should be the leaders in this movement. You have disappointed us in the selection of your presiding officers, but we will hope for grand results from this Convention. In the course of the meeting, now or later on, a committee on existing road laws should be appointed, and, perhaps,

various other committees. I hope, before this Convention adjourns, a permanent organization will be affected, which will have in it representatives from the State Board of Agriculture and from other associations representing other interests in the State."

The above remarks show the origin and purpose for which the Convention was called and the hopes as to its work. Addresses were made at this Convention on the "Value of Good Roads," Dr. James C. MacKenzie; "European *vs.* American Roads," Hon. Thomas Dudley; "Location and Building of Roads," General Elias Wright, C.E.; "Lessons from Experience in Road Building," by Chauncey B. Ripley; "Construction and Repair of County Roads," by James Owen, C.E.; "Cost of Maintaining Roads under Present Methods Compared with Proposed Plans, and State Aid Necessary in Building Leading Roads," by Judge Alfred Reed and Clayton Conrow; "Incongruity and Inefficiency of Existing Road Laws," ex-Judge William M. Lanning.

In addition to the above speakers and subjects, the following named gentlemen took part in the discussions:

Mr. Isaac B. Potter, New York; Mr. C. H. Luscomb, Park Commissioner, Brooklyn, N. Y.; Mr. James R. Dunn, of Ohio, President League of American Wheelmen; Major Charles L. Burdette, Connecticut, First Vice-President L. A. W.; Charles C. McBride and Frank R. Bergen, Elizabeth, N. J.; William T. West, Roselle.

From the above list of topics it will be seen the subject of Road Improvement was comprehensively covered, and the names of the speakers indicates the breadth of influence now at last concentrated on the one great object of improving the common highway, which is the property of the whole people.

This Convention adopted resolutions endorsing the Legislative enactments of the preceding winter: The State Aid Law and the Law abolishing the road overseers and protested against their repeal. A permanent organization was formed at the close of the Convention under the name of "The State Road Improvement Association." Hon. Edward Burrough, President of the State Board of Agriculture, was made President of the new organization; C. B. Ripley, Vice-President, and Franklin

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Dye, Secretary and Treasurer. Executive and Advisory Committees were also appointed.

Following this Convention the State Aid Law was amended so as to make it operative, and this legislation made the President of the State Board of Agriculture the administrative officer of the new law, for which law he and some members of the Board had worked so ardently and so long.

With his accustomed zeal, Mr. Burrough inaugurated the work of road building by State Aid. The plan was not generally popular. Sometimes the people of a section were favorable and their Freeholders opposed, and *vice versa*. But the work went forward. A beginning was made. Sample roads were constructed and these became object lessons to the skeptical where they were built.

Meanwhile a new cloud was gathering. There were farmers who feared these costly roads would bankrupt the counties wherein they were made. Naturally, their opposition was directed against the officers of the State Board who had been zealous for the laws that made this method of road construction possible. The Secretary recalls, at this time, a number of letters received strongly denouncing the work being done by the President and Secretary of the State Board in particular, stating "That if they kept on as they were going they would break up the State Board of Agriculture."

Now, the officers named, and no doubt other persons were as zealous for the popularity and usefulness of the Board as they were for the success of the State Aid Stone Road Law. But these warnings were heeded, for we immediately set out to devise a plan to divorce the road administration from the State Board of Agriculture. But for this opposition it is possible this work would have continued with the President of this Board to this day.

The separation was accomplished by an act, which received executive approval May 17th, 1894, and very appropriately, Edward Burrough was appointed the first State Road Commissioner of New Jersey, which office he filled until his removal by death. The Hon. D. D. Denise succeeding Mr. Burrough as President of the State Board.

Now, let us go back a little. The State Road Improvement Association was continued for some time. Similar meetings to the one described were held under the auspices of the State Board in 1893 and 1894. After the meeting of 1894, your Secretary resigned as Secretary of the State Road Association and E. G. Harrison was appointed Secretary. The Association has since, I believe, ceased to act, if not to exist.

From the foregoing rehearsal, it will be seen that our road legislation has been a growth from early, crude requirements, to the present high standard. The State now has a Road Department with a State Road Commissioner in control.

A concise statement of the road laws now in force is given by the Hon Henry I. Budd, State Road Commissioner, in his report for 1903, as follows:

"1. All taxes are to be paid in money.

"2. The office of overseer of highway is abolished.

"3. The roads of a township are placed under the management of the township committee, and money may be raised by township bonds for grading, macadamizing and improving the same; bonds to be authorized by vote at the annual town meeting.

"4. Under the County Act, the Board of Chosen Freeholders of any county may designate certain roads as county roads, and improve the same by the issue of county bonds, townships to pay one-third of the cost.

"5. Under the new State Aid Law passed in 1903, which supersedes the old law of 1895, the property holders along the line are relieved of the 10 per cent. part of the cost. Under its provisions the freeholders may declare any road a county road and by resolution improve same, or whenever a road is petitioned for by the owners of two-thirds of the lineal feet along said road it shall be the duty of the Board of Freeholders to cause such improvement to be made, but may require it as a condition that the townships through which said road runs shall pay 10 per cent. of the cost, the State paying one-third up to, at present, the limit of \$400,000 per year.

"6. The provisions of this act extend to townships, towns, boroughs, villages or any municipality or municipalities, all proceedings conforming, as near as possible, to the provisions of

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this act, and the governing bodies of any township, town, borough, village or municipality shall have the same power and perform the same duties as are conferred and devolve upon the board of chosen freeholders under the provisions of this act.

"7. Under the acts for the acquirement of turnpike roads for free public use, whenever the owners of two-thirds of the land fronting on any turnpike toll-road pray that said road may be acquired for free public use, and that they are willing to pay 10 per cent. of the entire cost of such road, the Governor appoints five commissioners to estimate and determine the fair and just value of said road; after having arrived at such value, if the State Road Commissioner ratifies the same, the board may purchase, the State paying one-third of the cost and the county paying the balance, 57 per cent.

"8. Or whenever the Board of Chosen Freeholders purchases a turnpike road and the State Commissioner of Public Roads approves of the same, the State pays one-third of the cost and one-third of the cost of placing in the condition of a new road."

New Jersey is the pioneer in building roads by State aid. "The first money paid in the United States under a law granting State Aid for the construction of public roads was paid to Middlesex county, New Jersey, by this State on December 27th, 1892, in the sum of \$20,661.85."—(Burroughs.)

Since the passage of the State Aid Law the State has aided the counties in building one thousand miles of road and paid for its share of the cost thereof, \$1,515,168.55. (Tenth Annual Report Commissioner Public Roads, 1903.)

So much for the past. But what of the future?

My desire, in common with other citizens and taxpayers, is that our roads shall be thoroughly well built *under whatever law* they may be constructed. Our State Aid Law says:

"The specifications shall require the construction of a macadamized road, or a telford or other stone road, or a road constructed of gravel, oyster shells or other good materials, in such manner that the same, of whatever materials constructed, will, with reasonable repairs thereto, at all seasons of the year, be firm, smooth and convenient for travel." The law requires the

construction of a "firm" road, and the macadam and telford idea in road making implies, "with reasonable repairs thereto," *permanency*.

The question arises are our roads being built as much as they should be with reference to their future usefulness as well as for their present service. Another thing most intimately connected with stone road construction is their preservation, and this not only, as the law says, "with reasonable repairs thereto," but with wheels having tires of sufficient width to materially aid in keeping the road "smooth" and well compacted. The continuous use of narrow tires on loaded wagons is a great injury to a well-built road. What further can be done to correct this defect?

State Aid is now generally popular. The (Trenton) *State Gazette* of December 5th, 1903, says, under the head of Good Roads:

New Jersey leads all the States in the Union in the direction of good roads. No public improvement of a general character has attracted so much attention during the past ten years as the improvement of the public highways. When the proposition was first broached there was a good deal of opposition to it from the farmers, who were satisfied with the "old-fashioned" highways. They could not see the advantage to them of smooth, hard roads, the building of which required a large expenditure of money; but it was not long after the first stretch of road was built that they saw the benefits of the improvement, and there is a greater demand for improved roads to-day than the State can meet.

Petitions for more than five hundred miles of new roads are now awaiting the approval of the Road Commissioner, and this fact is all the more remarkable when it is known that two-thirds of the cost of the roads is borne by the counties in which they are constructed.

Good road construction has outlived the prejudice of a good many men who opposed it on the ground that it was an extravagance.

The example set by New Jersey in this direction is being followed by other States, and we have the satisfaction of knowing that we are at the head of the procession.

Applications for road construction far exceed the means available. But let us not allow our enthusiasm to outrun a wise conservatism. Let us build well what we do, that each road completed by State Aid shall be an enduring and honorable monument to those who build the roads and to the State by

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whose aid they are constructed. And this, all the more, as we have no guarantee that the State can continue a so liberal annual appropriation for this purpose as is now possible.

But let us have a thought for our common, or dirt roads, as we go along. These cover the State and should be well drained, well made, kept constantly in good order, and beautified; instead of being kept so exceedingly unsightly and uninviting, as many of them are. With our increasing miles of stone roads, the common roads should be a credit to the localities where they exist, and thus the two combined, will add to the value of all landed property, and increase the popularity of our State as a place to live, to thrive and be happy.

Growth of Road Improvement, Repairs, &c.

BY HENRY I. BUDD, STATE ROAD COMMISSIONER.

The gentlemen named in Secretary Dye's valuable review of road building in the State never dreamed they would start a ball of fire that would set a continent and the isles of the sea ablaze, yet that has been the result of the passage of our State Aid Law. From Canada to the Gulf of Mexico, from the Atlantic to the Pacific, and upon the islands of our new possessions, both in the West Indies and the Philippines, the road question is being continuously agitated, and many hundreds of miles have been the result.

In our State, with much opposition and a small appropriation of \$20,000, which was not used, with another of \$75,000, and but little of it used, our appropriations have been gradually increased until the State Aid Law of 1903 was passed, which calls for an annual appropriation of \$400,000, which means an expenditure of at least \$1,300,000 per year, thus creating from 250 to 300 miles of State roads per year.

Other States, incited by the success of the New Jersey act, have appropriated as follows:

Connecticut, \$220,000; Massachusetts, \$490,000; New York, \$600,000 per year, and passed at its last session a constitutional

amendment, which allows the State to bond itself for \$5,000,000 per year for ten years, that is, for \$50,000,000 for the building of wagon roads.

Pennsylvania last year appropriated \$6,500,000. The States of Maine, Rhode Island, New Hampshire, Vermont, Delaware, California, Washington and Florida have adopted the principle of State Aid for the building of wagon roads, and nearly every State in the Union is moving in the matter. The State of New Jersey leads them all, having spent by State and counties \$4,545,494 in building 1,000 miles of roads. Connecticut has spent half as much on 454 miles; Massachusetts has spent \$5,150,923 on 480 miles, and New York has spent \$4,135,000 on 484 miles. New Jersey pays but one-third towards the construction, while the other States pay one-half, with the exception of Connecticut and Pennsylvania, which pay two-thirds of the cost.

There is now a strong movement by many of our National Legislators to pass the Brownlow Bill, which appropriates \$24,000,000 of national funds, the National Government paying one-half and the State or division of the State paying the other half.

Our members of Congress should be urged to use their utmost endeavor to make this a law, for by its provision we will receive at least \$546,000 of this sum, and much more if some other States fail to embrace its provisions. Although New Jersey pays scarcely one-third of the cost when bridges and extras are taken into consideration, yet New Jersey is the most active, and the desire the keenest possible in many counties to have their leading roads immediately improved.

REPAIRS.

Now that we have 1,000 miles of State roads and very nearly 1,000 miles of improved roads built by counties and other municipalities, the question of repairs becomes a very serious problem.

Under our old law of '95, any private citizen could mandamus the freeholders to keep the roads in repair, but they seldom did it. The law was never forced. Under the new law of 1903,

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the commissioners can withhold the State appropriation from any county that does not keep its State aid roads in perfect repair. The temptation to put this latter clause in force is, in many cases, quite great.

Complying with the law, most of the counties have appointed a permanent supervisor. In others, and in some cases where there is a large mileage, they have no supervisor, the freeholder of each township caring for the road in the township which he represents. The result is in some townships the roads are well cared for; in others, poorly. Some develop a great genius for road repairs, while others seldom get beyond the baby state of knowledge of road treatment. Then, too, the tenure of office of freeholder is generally short, and about the time he learns, his successor comes in to practice another ignorant role.

In most of the counties of the State we have adopted a plan of covering the stone roadbeds with a light coat of loamy gravel, loam or clay. This keeps the binding material moist, and consequently prevents ravelling; it takes the wear from the expensive stone and makes a soft footing for the horses' feet, but our new freeholders, thinking that if a little does good, a large amount will do greater good, instead of confining their efforts to a light sprinkling a fraction of an inch, they place the dirt on two or three inches thick and often apply considerable clay or stiff loam, which results, as soon as wet weather comes, in having a sticky surface, the clay preventing the flow of water from the stone surface and rutting the road; then, too, this clay often exerts, under the traction of the broad-tire wagons, a sucking or lifting power, which lifts the stones and carries them into heaps, destroying the smooth surface, and depressions and elevations become the rule. After there have been several applications of dirt, that, with the stone detritus, in time washes off to the side and makes a ridge that prevents the water from quickly flowing into ditches. This should be frequently removed. The Mercer county supervisor has devised a cheap and light scraper, by which he quickly moves this back to the center of the road, and thus the expense of several applications of fresh dirt is avoided.

Many of our roads in Burlington county have for several years thus been kept in order for about \$50 per mile. The cost of keeping the stone roads in proper repair with stone runs from \$150 to \$325 per mile, depending upon the width of the road and the amount of traffic. It has been estimated that it costs from 3 to 3.5 per cent per square yard for repairs.

There is no question but what our stone roads are, in some sections, rapidly increasing the value of property, and where they do not, they make the property more valuable for production, for they give rapid transit for all the products of the farm.

The Brownlow pamphlets which we distribute among you, we hope you will carefully read, and use each one not only yourself but incite your neighbors to write letters to your Senators and Congressmen to do their best for the passage of the bill.

The President—We will now be pleased to hear from Mr. Conrow.

Mr. Conrow—Mr. President and members of the State Board of Agriculture, the distinguished gentlemen who preceded me on this subject have almost exhausted it. It happens that they prepared their essays in the line that I have taken. It remains only for me to say that a feeling of thankfulness comes over me when I consider the number of obstacles that we met with in getting this road law before the public that have been overcome. It is a feeling of congratulation. It rarely comes to pass that in advocating any reform to find the realization of the reform following so closely upon its initiation.

When I remember that Macadam and Telford, who were born in the fifties of the eighteenth century, expended nearly the whole of their lives to get the people of England to improve their highways—Macadam was fifty years of age before he got his first road. He spent his substance and wasted his effort. He finally appealed to Parliament, and his appeals were so strenuous, that like the woman who married the man to get rid of him, Parliament granted his appeal and finally built one road as an object lesson. The road was built and that road spoke more loudly for road improvement than all the speeches ever made in England, than all the advocacy of that measure before.

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We eventually got our road improvement scheme started. We had a road put down in Middlesex and one in Burlington, and they were object lessons. They saw it was possible to build stone roads in this country. They spoke for themselves, and spoke louder than we could speak in their favor; and it so happened that those who had first opposed now became earnest advocates of road building. If this measure had been submitted to a vote of the people of New Jersey it would have been defeated by an overwhelming vote, as is proved by this petition that went before the Freeholders of Burlington county, the vote stood nineteen against eight for building the road. It was only by appealing to the court for a mandamus to compel them to build the road that we got the road at all. That was the starting point.

To go back a little, I recall some twenty years ago, I was asked to prepare a paper on Road Improvement, to be read before the Burlington County Board of Agriculture. I accepted the task, being desirous of benefiting my fellow-man as much as I could, and then looked for data, for some material that would be of interest to my fellow-man. I searched the libraries in my neighborhood in vain for a word, a letter, that would throw any light upon road building in America. I had to go to Macadam or Telford to find anything written or anything printed that would give me any clue to material that would be of advantage to our people.

Macadam, as I said, commenced the building of roads in 1816. The historian says that within the next twenty years four-fifths of all the roads of England were macadamized. Such was the rapidity with which this measure spread over England that in twenty years four-fifths of all the roads were macadamized. In 1889 some of the Professors of the University of Pennsylvania, although it was not a University matter, joined in the raising of some money to offer as a prize for the best essay on Road Building. Seven hundred dollars was offered, \$400, \$200 and \$100, for the best essays for the purpose of agitation on this subject.

It seemed to me as I examined the various libraries within my reach that the subject of road-building was one of the lost arts.

For two generations of men there was scarcely a word printed or written on the subject. There was no one to follow and take up the work of Macadam and Telford. The subject of building railroads overwhelmed all other considerations. The subject of building a national wagon road was agitated in Congress in the twenties, making a military road from tidewater to the Mississippi river; but it was only partly built. The subject of railroads came up, and the attention of the people was diverted wholly to the building of railroads, and therefore the subject of common rods was entirely neglected.

I would say in the awarding of these prizes, the first prize was won by a citizen of Canada, there was no writer in our country who sufficiently understood this subject. The Judges didn't know the writer, or his locality, but they gave him the first prize and the whole thing was printed, all the essays that won prizes, and others which won favorable mention, together with other extracts from Macadam and Telford, and it was a valuable addition to the literature of our country. I have a copy and I prize it most highly.

This was printed in 1891. It was a little too late for our State Aid road law. It was a tabooed matter; it was a forbidden subject. Macadam was looked upon as a man who had an unbalanced intellect and the idea of Parliament was to get rid of him, not to build the roads, but to get rid of Macadam. We could give some account of the discussion which occurred on the subject of road building in our annual spring town meeting. If an enterprising citizen asked for an appropriation, he would provoke the citizens of the backwoods district who opposed it with all their force, and if the appropriation was granted some politician who had broken down in every other occupation in life was awarded the privilege of expending it and I am safe in saying that 50 per cent. of that money was often wasted, some people say 75 per cent. We got no good of it. I asked myself is it possible that our form of government precludes road-making? Is there anything in our Constitution, in our make-up, in our principles, which forbids such things. England may have her beautiful system of roads under Macadam, France had the best system of highways in the world, Italy and Germany

had good roads, cannot free America also have them, and I studied this thing.

I saw a wagon passing. That wagon started from this township. Another wagon comes from the adjoining township, another still follows that comes from another township beyond. Those townships should help to build that road. Here comes another wagon from the next county, and the next county beyond. I felt we must not burden these people along that road only, and therefore the State should pay a part, and that is the way I came to the idea that the State must join in the building and maintaining of roads. It was a hard matter to get this thing before the public. We are so imbued with the principle of the sovereignty of the people of the township. This was the prerogative of the township, that they should take care of their own roads, and they looked with jealous care upon any inroad by the State or county. They didn't expect the State to take charge of their roads. They were opposed to all sorts of paternalism and they resented it.

But we got this matter before the Legislature, and appealed to the county for assistance to build them, and they revolted. They refused to build in our case. I think in Middlesex they adopted the first petition. I don't know what influenced them, but it is a fact, they built the first road, and from that the thing has gone on and it has spread, and all the other States are taking it up, and I am thankful that we are in the front. This matter has placed New Jersey in the front of the procession. I thank you for your attention. (Applause.)

Mr. Denise—While we are on this subject, there was a bill passed by the Legislature last winter annulling part of this law that was passed a few years ago, whereby the Township Committee had charge of the roads; this bill that was passed last winter takes that power out of the hands of the Township Committee, and places it in the hands of a supervisor, and also adds two members to the present Township Committee. That affects townships containing 4,500 inhabitants or more. I would like to know from the gentlemen present whether that law is entirely satisfactory to them. It is not to us.

Mr. Jones—I can substantiate what Mr. Denise has said, being in the same township, we are affected by this act and its is entirely out of place. We elect a supervisor according to this act and two extra Township Committeemen. The Township Committee has power to fix the salary of this officer and they placed it at \$600, and he has not done \$10 worth of work up to this time. In the district where I live, we have had no Overseer or Supervisor or anything else. A year ago I was Overseer myself and I did not expend all the money that was appropriated to my district, and this year there has not been as much spent on the roads as what I left unexpended last year.

For years we had an appropriation to our district of about \$140 for six miles of road, which kept them, and we have improved our roads wonderfully with that amount, but now we have gone back, and I move that the Legislative Committee of this organization will use their efforts to have that law repealed. It passed, I think, February 23d, 1903.

The President—I would like to hear from Dr. Ward. He is one of the members of the early road committees.

Dr. Ward—Mr. Dye has covered that ground so thoroughly that there is little for me to add. Our first amendment to the Township Law taking the powers from the road overseer, met with a great deal of opposition. My thoughts were turned, when on that committee, into that line by an overseer that we had who was elected in the old-fashioned way by a few farmers who would get together in a certain place, and elect the overseer. Generally, before that meeting the man who wanted to be elected, would, in the first place, send down a couple of kegs of beer, and the laborers, not the farmers and the property owners, but the laborers, legal voters, would be there and elect the overseer. We at that time wanted to improve the main road between Elizabeth and Newark. Instead of the old-fashioned way of throwing the dirt up out of the gutters into the center of the road, to be all washed back again by the first heavy rain, we wanted to commence in a small way for a more permanent road and put a small part of our money into stone each year. I went to that meeting and had a resolution passed authorizing the road overseer to take a certain portion of the road money and

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expend it for stone, and we elected the Overseer. Did he carry out the resolution? Not in the least. The very moment he was elected, the answer he gave me when his attention was called to it was—well, it would not do to repeat here. That was the way our overseers did in those days. They were above every officer in the township and would take our money that was voted and spend it on the roads in any way that they pleased. So that all efforts to change that condition met with a great deal of opposition.

For two or three years I was appointed on the Legislative Committee of the State Board. After we got the law placing the control of the roads of a township in charge of the Town Committee, the opposition came down hot and heavy to have that law repealed, but by staving it off and fighting it, we kept it on the statute books, and I am surprised to hear that there was any amendment to that law last year. As it was, before the last amendment, it was one of the best laws that was ever passed.

Mr. Jones—I agree with the gentlemen.

Mr. Collins—It seems to me the law spoken of by Messrs. Denise and Jones is a contemptible nuisance. It does not apply to us now, but the day may come when it will. Leave the roads in the hands of the Township Committee. They can do it by contract, and I would be very glad to second the motion of Mr. Jones.

Mr. Denise—The law of last winter affects six townships in our county, and I have been told that the supervisor has ignored the Township Committee entirely, and went on and spent just what moneys he pleased, and when the Township Committee called his attention to it, he said: "Gentlemen, you have no control over it, I am elected by the voters." We have taken a step backward in that road law, and I would like to go back to the former law.

Mr. Elias Black—I own some property in Monmouth county, in Shrewsbury township, and I am very much opposed to this amendment that gave us the township supervisor. Under the working of that law with the supervisor, in Shrewsbury township the roads are not half cared for as they were under the old system by the Township Committee.

The motion of Mr. Jones, that the Legislative Committee from this organization be instructed to use their efforts to repeal that law, passed February 23d, 1903, was then put to a vote and carried.

Mr. Demerest moved that the several reports and papers be received and placed in our Annual Report. Motion seconded and carried.

Mr. Mitchell—Governor Hoard told us how much good was done by a hundred letters to Congress. It seems to me in regard to this Brownlow bill, something might be done and at a very little expense. If the Legislative Committee will send a letter explaining this bill to the Secretaries of all Farmer's Associations containing a stamped and addressed envelope for the answer, and ask each Secretary to have as many postal cards as possible written to the proper Congressman favoring the Brownlow bill, and the number written to be reported to the Secretary, so as to know how much good was done, I think it would be a good thing. This circular letter might be printed so as to relieve the Legislative Committee of too much work. In that way we would get a large number of letters to our Congressman, and perhaps have a good effect. I make that as a motion. The motion receiving a second was put and adopted.

Mr. Forman—What attracted me here to-day was this order of business, which says "Some defects in the present system of stone road construction and subsequent management."

There seems to be a great difficulty in our county in building stone roads, or in the subsequent management. When we have them constructed they are finished off very nice. There is nothing like them. They are accepted, the contractor is paid off and that is the end of it. Six months after, if you drive over them, you may have to pull off into the ditch to get rid of some of the stones, and if it is a little wet or muddy your wagon will pick up the mud and you wonder why you pay \$8,000 a mile to build such a road. I came here to ask Mr. Budd, or some of our stone road men if there is any remedy for any of these defects, if not, I would like to ask to have the Legislative Committee instructed to secure the enactment of some law which will remedy that defect. To me it seems folly to pay

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the money that our stone roads cost in Monmouth county and then not have them in fair condition capable of enduring reasonable use.

The President—I think Mr. Budd answered one or two of the questions in his paper stating that that matter was in his hands, if the roads were not properly cared for he could withhold the money.

Mr. Budd—There is no doubt that in some cases the road gets in this condition, and in the very county of Monmouth the difficulty lies with the freeholders. I have been urging them to appoint a supervisor of Monmouth county roads. Each freeholder takes care of the road, when he has time to attend to it, and when he has not, they do not get attention. The law requires them in each township to appoint a Supervisor, but many of the freeholders prefer to get the pay that should go to a supervisor for attending to the roads. There are no roads built so good or so handsome but what they will get out of order, and there is nothing in this country that receives such wear as a stone road, not only from ordinary causes, but the farmers will shoe the horses so rough, which gives them a peculiar fitness for picking up stones; then the farmers will persist in having narrow tires. But I will undertake to say that the roads as they are at present constructed, if covered with a slight coat of sand or gravel, or such material as comes to hand, the surface will be protected from the picking of the horses' shoes. The people are gradually learning this fact, and freeholders who have been long in service know it; but they get out of service and new ones come in and before they learn how to care for the roads, the surface becomes disintegrated.

I am continually urging them to attend to their roads, as complaints are constantly coming from different parts of the State, but as a whole the roads are well cared for and are a pride to the State.

There is another question about these roads, the longer they are used, that is, when they get down to final repose, they are more firm than when first made. One important point in construction is to thoroughly roll and consolidate these roads, then when they are turned over to the freeholders they will wear better. There

is a tendency in construction not to give them the proper rolling, wetting and binding, then when the wagons go over them they more easily disintegrate on the surface. I have walked miles over roads where the whole surface was covered with loose stones and the result has been the freeholders, contractors, etc., have been condemned in the worst of terms. But those roads were constructed nine or ten years ago. You can go over them to-day, and you will find them just as firm and solid as they ever were. They have got down to final repose as any road will do before they will cease to rut or ravel.

Mr. Roberts—If they don't wear out.

Mr. Budd—Yes, they will wear out. Mr. Roberts has a road by his place, ten feet wide, one of the first constructed. The number of vehicles moving on that road is continuous, like a funeral procession, and the traffic ten times as heavy, consequently, that road will wear out, anything will. The most perfect stone and brick placed on streets of cities will wear out. I understand there is no road in the United States gets such wear as that road passing Mr. Roberts' place, and consequently, it has to be re-surfaced. The traffic comes five or six miles each side of it, with double teams, to bring their loads so as to get on to this road, and then they send one team home, and the other team takes it on thirty or fifty miles to the city.

Mr. Forman—In our town where stone are thrown on the streets in a loose manner and trodden down by the traffic, they are much better than the State roads. In the streets of Freehold, they are comparatively smooth, but go out to an \$8,000 per mile road, and your horse must walk.

Mr Budd—The reason for this is, in the city of Freehold they water them every day, and there is nothing like a little moisture to keep the stone from ravelling. In all towns of considerable size they water the road, but in the country they do not.

Mr. Black—The gentlemen of Monmouth county should act on your suggestion and get a County Supervisor. We don't have any such complaints in Mercer since a permanent county supervisor has been appointed.

Mr. Budd—Whatever complaints are made you have the remedy in your own hands, every citizen can mandamus the

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Board of Freeholders to keep your roads in repair. The county appoints the Supervisor and if the citizens would only mandamus the freeholders, they would only have to do it once. The law provides the remedy to the individuals who have most interest in the roads.

Mr. Denise—Just one question, have you anything to do with the appointment of a Supervisor, or recommending the Supervisor in the county?

Mr. Budd—No, nothing whatever. The Board of Freeholders appoint.

Mr. Conrow—I desire to offer a resolution in regard to broad tires. It seems to be necessary, we have spent a great deal of money on the roads and we should take some means to protect them. Our teamsters have no conscience about the loads. They can hardly get enough on their loads. In our neighborhood two and one-half tons I have known to be put on one wagon, and the tires soon wear down to an inch and they cut like a wedge. I think it is necessary that this State Board should speak upon this subject.

Resolved, That the State Board of Agriculture earnestly appeals to the Legislature now in session for an act making the use of broad tires on State Aid roads compulsory.

A Member—Will you state the width of tire?

Mr. Darnell—France has it six inches for a certain number of tons.

A Member—Some of our farmers adopted a six-inch tire, and since that time trolleys have been laid, and to fit them they have narrowed the tire. They have been compelled to relinquish what they formerly used, simply because they cannot go on a trolley road with the wide tires. There are many things to take into consideration in this matter. I have neighbors who use the wide-tired wagons, appreciating the good roads, but have been compelled to narrow them by the trolley roads.

The Secretary—You might make it read "Such tires not to be less than four inches in width."

Mr. Roberts—Carrying two-ton loads.

Mr. Darnell—Make it less than two-ton loads. You can follow the heavy loads for miles.

A Member—I think there was a suggestion some year ago giving a rebate each year, lessening it for three or four years, and then make the broad tire compulsory.

Mr. Roberts—Before the State Aid road law, the township of Chester in the county of Burlington did its own macadamizing of roads, and they deserve a great deal of credit for this road improvement. The township issued \$40,000 worth of bonds, and they built a lot of stone roads, and for their own protection, to protect the roads that they built with their own money, they gave a rebate, and do to this day, of \$4 annually for every wagon used on their roads with tires over four inches.

Mr. Darnell—That law applies to other townships as well, if they see fit to take advantage of it.

Mr. Black—Is there not a law in the State that gives a man fifty cents or a dollar a wheel, and yet there is no one that claims it. We use those wheels for our own benefit. This resolution would compel me to put a four-inch tire on my buggy.

The President—I think the principle ought to be adopted.

Mr. Denise—I think that our Executive or Legislative Committee can regulate that part of it. I move the resolution be referred to the committee. So ordered.

Mr. Denise—Mr. President, I have been very much pleased with this meeting, very much indeed, and as we have nothing else to offer to our Executive Committee and our officers of the State Board for the faithful performance of their duty, for giving us such a fine meeting, I move that a rising vote of thanks be extended to them.

Motion being seconded was put by Mr. Denise and received a unanimous response.

Mr. Roberts—I just wish to say how satisfactory this meeting has been to me. This road question has been close to my heart always. It brings to my mind 1846, when I had the pleasure of being in the United States Senate and hearing the debate between Thomas H. Benton, of Missouri, and Henry Clay, of Kentucky, in reference to the extension of the National roads

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from Vandalia, in Illinois, where it then terminated. Benton wanted it extended to Jefferson City. I had the privilege of listening to the debate that lasted nearly a whole day between these two famous old gentlemen on that very subject, and it was almost as interesting to me then as it is with us to-day.

At the conclusion of the road discussion the Board, on motion, adjourned *sine die*.

FRANKLIN DYE,
Secretary.

Annual Address of President.

DR. EDWARD B. VOORHEES.

In my annual address of two years ago, the origin, establishment and development of our Board of Agriculture was reviewed, and the wisdom of the plan providing for county organizations and the various ways in which the Institution has been of service to the farmers of this State, and to the progress of agriculture in general, was pointed out, as well as its influence in the development and improvement of those factors which have both a direct and indirect interest for the public in general.

In my address last year, the various lines of work at present occupying the attention of the Board, and their widening influence in the betterment of the farming conditions in the State, were quite fully reviewed.

It seems hardly necessary to repeat either the matter referred to in my first address, nor to emphasize, as last year, the importance of various lines of work taken up by our Board, and their efficient execution, as these points are discussed in some detail in the report of the Secretary, though it is important that we should clearly understand the functions of the organization of which we are members, and be familiar with the methods employed in their exercise.

In the presentation of the President's address this year, it has seemed to me that it might be helpful to us to consider for a few moments some of the weaknesses of our present lines of practice, and how they may be strengthened, in order that our farming may be made still more successful, and that greater progress may be made in the future than has been the case in the past.

The more I study the natural advantages possessed by our State, and I seize every opportunity for such education, the more

I am impressed with them as providing an ideal State for farming, and as a home for farmers, for we should not forget that farming differs from most lines of business, in that the home is a part of it, and not separate from it. Perhaps there may be States in this Union where more money may be made by farming, but it is my observation that these farmers are constantly looking forward to the time when they shall have made enough to enable them to make a home elsewhere, where they may have those concomitants of civilization which the farmers of New Jersey have as a matter of course. Here we have the important advantages of nearby markets; of rapid transit for our produce, and of ready communication for our families; of soils adapted for a wide variety of products, and of opportunities for education and social culture, not possessed in such degree by any other commonwealth.

It is needless for me to dilate on these various and important advantages, particularly from the home standpoint, because they are well known to you all. What I desire more particularly to emphasize, is the importance of an appreciation and a fuller utilization of what we now have from the farm side alone. We do not need to seek for examples of very profitable farming in practically all lines of practice—they are apparent everywhere, and these examples emphasize, first, that our conditions are well adapted for the growing of specialties, and that these special crops can be successfully and profitably grown. Where the practice is not so successful, the fault is rather with the grower than with the conditions. To more fully illustrate my meaning, I will cite a few instances.

SPECIAL CROPS SUCCESSFULLY GROWN.

In the northern counties of the State, certain small areas are growing apples most successfully; the conditions of soil and climate are particularly well adapted for this crop, and these areas are but representative of larger ones in this same section, which could profitably grow the same crop. We have other areas, larger, though still relatively small, where peaches are made a very profitable crop, and these areas are but representative of very much larger areas, where this crop could be successfully

grown. We have certain sections where hay is quite generally grown, and is found to be a profitable crop, in part because secured at a minimum of labor, and these again represent larger areas where this crop may be grown successfully. We have certain relatively small areas in the central and southern portions of the State, where special forage crops are grown for supplementing the home-grown foods generally used for the dairy, rather than by the purchase of concentrated feeds, and dairying is a profitable business, and establishes the fact that such crops may be grown, and also that such methods are entirely practicable. We have certain other areas, relatively large, in the central and southern sections of the State, where white and sweet potatoes are very profitable crops, and yet these areas represent larger ones where these crops could be more profitably grown than others that now occupy the attention of the farmers. Certain areas of our State are remarkably well adapted for small fruits, berries and market-garden crops. Plums, cherries, strawberries, asparagus, celery, melons, peppers, tomatoes, etc., are grown with very great success. The small areas upon which these are grown, are but representative of contiguous and larger areas. These examples are quite sufficient, it seems to me, to serve as a basis for a profitable discussion.

In the first place, the very fact that this wide variety of crops are successfully grown under the conditions obtaining in the State, proves that they may be more extensively grown if our farmers, who are now dissatisfied with their present conditions, would sit down and study the situation, in order to discover the line of least resistance, and then make up their minds to follow it. They would not only improve their own condition, but assist in the development and progress of the business as a whole. Why should a farmer in the apple-growing districts, for example, continue in old-line practice, and be unable to make his farming pay properly, when on the farm adjoining, the apple grower is making a success? His conditions are quite as good—it only requires that he shall adopt and use what the business man would call “business principles.” A business man does not keep old stock, and attempt to force it upon the public at his prices, when a new stock of a different style is what is desired by his cus-

tomers, what they are willing to pay for, and what his competitors are preparing to supply them with. Why grow wheat, oats or buckwheat, in competition with areas that can grow wheat, oats and buckwheat to much more advantage than he can, but cannot grow apples? The same is true in other lines of farming. Take, for example, the man who raises corn, wheat and oats, and selling them as raw materials; he is raising good crops, it may be, but is not getting enough for them to make his business profitable, when on an adjoining farm, with land of the same character, his neighbor is raising hay and is doing a very profitable business. The demand is for hay, and at profitable prices, and he can grow it; there is not a great demand for his crops at profitable prices—why not grow hay? So the dairyman, who is successfully demonstrating that by the use of forage crops and the partial or complete soiling system, he can increase the number of animals kept on a definite area, while at the same time reducing the cost of milk, should be followed by his neighbor, who has equally as good land; equally as good facilities, but instead of adopting modern practice, is following in the old line, making the dairy an adjunct to something else, and neither venture being successfully prosecuted.

This line of progress may also be profitably discussed from another standpoint. Here is a man in a potato district; he makes a specialty of this crop, but he is getting only half the yield his neighbor has shown that it is possible to get, because he does not concentrate his attention upon growing potatoes, and give them the best cultivation and management, and thus he reaps but half the benefit that could be obtained from the same land. He is not successful, because he has not studied the peculiarities of the growth of the crop, and the feeding and handling of the plant, and its relation to other crops. These conditions should not exist in our State; our farmers should not be content with following old-line practices, and should study their conditions, both in reference to the character of their soil and its location, as related to the kind of crop that they may grow and also the principles which are involved in the increase in their crops upon definite areas.

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THREE IMPORTANT LINES OF STUDY.

It seems to me, therefore, that I can do no better to-day than to urge upon the farmers of this State, three things: First, A study of the location and natural character of their soils in reference to their adaptation for particular crops; second, a study of the possibilities of a substitution of other crops than those now grown, and better adapted for their particular purpose, as well as an addition of one or more crops to those already grown; and third, a more careful study of the characteristics of crops, and their requirements, both in reference to culture and plant food, in order that maximum crops may be grown, or in brief to grow the crops that are adapted to the conditions, and grow them intensively.

The one thing that has impressed itself upon the thinking farmers of the State, and they are the successful ones, is that farming must be specialized more fully in the future than in the past. General farming does not pay as well, because it includes those crops which are more easily and cheaply grown elsewhere. Nevertheless, it is not so essential, in order that success may be accomplished, that this specialization shall be complete, or confined to one or two crops; it is enough in certain cases if one special crop, which may be regarded as the money crop, is introduced, and its growth also contribute to the cheaper production of those of less money value.

Fortunately, our State is so located as to make the growing of special crops for nearby markets more easily accomplished than in States further distant from large markets. It is also located geographically in such a way as to admit of a very wide variety of crops, ranging from those possible to grow with the shorter summers and longer and colder winters of Sussex and Warren counties, in the northern section of the State, to those possible with the comparatively long summers and short winters of Cape May county, in the southern part of the State. So that even though farmers specialize completely, there would be no danger of over-production of any one crop, owing to the fact that a wide number of crops would be grown, and that they would

come in the market, particularly the small fruits and market-garden crops, in succession, rather than all at once.

In the next place, the character of soil and climate should be a primary guide in reference to the adoption of particular crops, though it should be understood in the beginning that climate and soil alone are not a sufficient guarantee of success. These, when properly adapted for the crop, simply guarantee that the best natural facilities are offered for the growth of the crop, and must be accompanied by care in the management of the crop itself, as well as the proper disposal of the product. It is my judgment, that no better natural conditions for apple growing, especially the later sorts, are found anywhere in this country, than in the more northern counties of our State (though they are profitably grown elsewhere when proper varieties are selected, and the soils are suitably fertilized); they are naturally well drained, and a sufficient distance from the sea to prevent injury from the warm, muggy conditions and high winds which are often disastrous on the coast. The soil in these sections consists in large part of decomposed original rocks, and possesses the physical character and chemical qualities that will permit the roots of the trees to readily penetrate the soil, and to great depths, and to permit the absorption of an abundance of moisture and of food, and thus not be seriously affected by short droughts, besides, the location is not so far from markets as to make the cost of shipping excessive, particularly if sufficient quantities are grown to make it possible to ship in large lots. I am convinced, also, from a study of the conditions, that the judicious planting of apples in those northern counties, would not interfere materially with the dairy business, now well established in many districts in that section, as the orchards might occupy the high hillsides, while the valleys and lowlands could still be devoted to forage crops for the dairy. This combination could be successfully managed, and would accomplish in large part the proposition originally pointed out to grow that which is profitable and well adapted for the locality, and at the same time to intensify the productions.

These same considerations may apply to peach growing, as well. It is interesting to note the northward drift of the peach-

growing belt of this State, for while peaches have been and are now successfully grown in certain sections of South Jersey, the main belt has been above the middle of the State. Fifty years ago, the peach-growing section was in the center of Somerset county. It gradually moved northward into the upper part of Somerset, and into Hunterdon and Morris, and now reaches its maximum in Sussex. A careful investigation of the conditions that have been effective in this migration, show that the crop was successfully grown only so long as the trees would bear profitably without special treatment. The movement is, therefore, due to the same sort of farming as has been done by the pioneer farmers of the country, and is being done even at the present day, namely, to adopt such methods and grow such crops, as rapidly take from the soil the food which is readily available, and as soon as this is partially exhausted move on to richer lands. I believe that there is a future for peach growing in this State, and that the culture could be as successfully prosecuted to-day in those sections of Somerset and Hunterdon counties, where they were formerly grown, and even in other parts of the State, if proper care were given in all directions, as understood at the present time. We can better afford to supplement the exhausted food conditions of soils naturally well adapted for this crop, than to attempt to grow general farm crops in competition with those areas whose natural conditions are more favorable for them than ours. What is required is that the farmer shall study his conditions, and adapt himself to them, and then to provide the necessary food and care not provided by nature.

Second, it is my judgment, too, that in the strictly agricultural counties, the growing of hay could, in many cases, be profitably substituted for the grain crops. It has been demonstrated both by experiment and practice, that grasses may be successfully seeded alone and not in combination with grain, as is the usual custom, with the advantage that a crop is obtainable the following summer, and further that such seedings may be made on old sod, without the introduction of other crops, thus practically permitting a continuous hay cropping, and which is much more profitable than the grain farming, because all the crops are paying crops. This, of course, requires that the grower should take

advantage of all the information available, in reference to the needs of the crop in reference to both plant food and general management.

These general considerations apply to other crops, as berries and small fruits, for which our natural conditions and location are so admirably adapted. The areas of these should be increased, in order that advantage may be taken of facilities now offered for ready shipment and general distribution. The advantages of a concentration of energies upon special crops are admirably illustrated in the sweet and white potato and tomato districts of some of our southern counties. When the reputation of a section is established, when it is known that a certain locality produces large quantities of a certain special crop, there is no lack of buyers, and at profitable prices, because there is a demand for them and a competition among buyers for the best.

One other important consideration in this matter of specialization, is the study of soils in reference to more concentrated or more extensive cropping, or the direction of energies in such a way as to make nature contribute to the growth of those crops, not now profitably grown. One of the greatest sources of loss to our farmers, particularly in the central and southern sections of our State, is the infrequent occupation of the soil by crops. The crops grown, perhaps, are good enough, but the cost of producing them is too great, and this cost is increased, because advantage is not taken of the natural conditions, or natural and helpful agencies, in order to provide the plant with food derived from the atmosphere, and also to prevent losses from the soil that may occur, because of the intermittent covering of the soil. It has been demonstrated beyond a doubt, that in the ordinary rotations now generally practiced, that it is possible to introduce crops that will not only prevent rapid losses of plant food, but will on the contrary cause an increase of available food to the soil, and improvement in its physical character, while at the same time providing crops that are of the greatest service for home utilization, and in many cases that can be grown to very great advantage. Farmers in these days should realize that it is not area so much as the concentration of energy upon what one has. A forty-acre farm, managed on the intensive system, can be

made to produce more crops, and at a less cost per unit of crop, than can be produced upon a 160-acre farm under the old or extensive system of management. Areas should be virtually multiplied, because of larger production, rather than by the addition of contiguous territory. This permits of either reducing the necessity for purchased labor, or it enables the producer to employ labor continuously and at good wages, thus in large part eliminating that disturbing factor in many lines of work. While it is too true that labor is not efficient, and is hard to get in country districts, still where the work is so arranged as to make it possible to employ and keep laborers occupied the year round, the question is not so serious a one, besides, I am satisfied that if this practice were general, a better class of laborers would be developed.

In the third place, improvement in our farm practice could readily come from a more careful study of the characteristics of crops, and their requirements, without causing a largely increased expenditure for the necessary plant food. As already pointed out, we are covering too large an area, and not paying sufficient attention to the needs and special requirements of our crops. We have abundant evidence of the value of just this careful study in certain of the market-garden districts, where the plant is studied in these respects, and the food applied meets specific ends.

In the first place, the financial results obtained from the application of manures and fertilizers are influenced in a very large degree by the character of the crop itself, whether the market value of an increase in crop as great as can be expected from a definite application is high or low. On this basis, crops may be classified into two general groups: First, those which possess a high fertility, and as a rule, a relatively low commercial or market value; and second, those which possess a low fertility value and a relatively high commercial value. In the first class are included the cereal and forage crops, as corn, oats, wheat, hay, buckwheat, and in the second, are included the various vegetable and fruit crops. This classification, and its importance, may be illustrated by the following examples:

A ton of wheat, at 75 cents per bushel, will bring \$25. Its sale removes from the farm 38 pounds of nitrogen, 19 of phos-

phoric acid and 13 of potash. At prevailing prices for these constituents, it would cost \$6.50 to return them to the farm; or, stated in another way, the farmer receives for his constituents 56 cents per pound for nitrogen, and 11.2 cents, respectively, for his phosphoric acid and potash.

A ton of asparagus shoots, at 10 cents per pound bunch, will bring \$200. Its sale removes from the farm but 6 pounds of nitrogen, 2 of phosphoric acid and 6 of potash, which could be returned for but little more than \$1.00, or in other words, the nitrogen brings \$26.30 per pound, and the phosphoric acid and potash, \$5.26 per pound, respectively.

A ton of timothy hay will bring \$15. Its sale removes from the farm 18 pounds of nitrogen, 7 of phosphoric acid and 28 of potash, amounts that would cost \$4.00 to return to the land.

A ton of apples, as they run, will bring in an ordinary season, \$20; if of high quality, as high as \$40 at the farm. It carries from the farm when sold less than 3 pounds of nitrogen, 1 of phosphoric acid and 4 of potash, which would cost less than 60 cents to return to the land.

It is thus shown that crops like wheat and hay possess a relatively low commercial value, and yet carry away when sold, a very considerable amount of the fertilizing constituents, while vegetables and fruits, as illustrated by the asparagus and the apples, have a high commercial or market value, and carry away but minimum amounts of the fertilizing constituents. This distinctive character of crop, while not an absolute guide as to the profits that may be obtained from the use of fertilizers—since the cost of production varies widely for each class—is instructive in showing that those of a low commercial value are more exhaustive than the other class, or those of a high market value, and it is certainly suggestive, since it points out the necessity for judgment in the application of fertilizers that shall be made in the case of crops of the different groups, as well as the importance of the adoption of specialties in the way of vegetable crops on soils not naturally well supplied with the fertility elements.

In the next place, the character or feeding capacity of the plant and its season of growth should be considered, that systematic methods may be adopted, and thus that waste of fertilizing

materials may be avoided, not only, but that the applications may be made at such times and in such amounts as will, other things being equal, promote the greatest increase per unit of applied food.

While each plant possesses individual characteristics which distinguish it from all others, for our purpose they may again be classified into general groups, which possess somewhat similar characteristics, particularly as to their method and time of growth and their capacity for acquiring food from soil sources.

The cereals possess distinct and important characteristics of growth. The roots branch just below the surface, and each shoot produces feeding roots which distribute themselves in every direction, and thus absorb food from the lower layers of the soil as the plant grows older. Because of their wide root system, and because of the character of their feeding rootlets, they are able readily to acquire food from the insoluble phosphates and potash compounds of the soil, though they are unable to feed to any extent upon the insoluble nitrogen. Furthermore, inasmuch as the most rapid development of many of these crops takes place early in the summer, before the conditions are favorable for the rapid changing of organic nitrogen into nitrates, they are with the exception of Indian corn (maize), specifically benefited by early applications of nitrogen in the form of nitrate. That is, wheat, rye, oats and barley are specifically benefited by the early application of quickly available nitrogen.

Forage crops, including both the grasses and clovers, constitute another group, insofar as their use is concerned, though possessing marked distinguishing characteristics. Of the grasses, nearly all species are perennial, though their length of life depends upon the method of cropping and upon the character of the soil. They resemble the cereals in their power of acquiring mineral food, and are even more benefited by the application of nitrogen, since the chief object in their use is to obtain the nitrogenous substances contained in leaf and stem in the form of pasture, forage, or hay, rather than the matured grain. Hence, nitrogen, which promotes this form of growth, is an important constituent, and under any conditions there should be a liberal supply provided.

In the growing of hay for sale, the importance of a knowledge of these characteristics, and the advantages of putting the knowledge in practice, is readily demonstrated. In experiments conducted by the Experiment Station, it was shown that the application of nitrate of soda as a top dressing in spring caused an increase in crop of from 25 to 60 per cent., worth \$5 to \$15 per acre, according to conditions of soil and season—a very profitable practice in all cases.

One of the strongest arguments put forward in favor of soiling, rather than pasturage, is that smaller areas are required for supplying the needs of the animals, and this argument is quite as strong in favor of proper manuring or fertilizing, because the larger yields obtained result virtually in decreasing the area required for producing the food for a definite number of animals. It has been shown in the experiments conducted by our Station, that the use of nitrate of soda upon four different forage crops, increased the yield from 37.6 to 96.6 per cent. Or, in other words, for a specified requirement the area needed was virtually decreased in these proportions.

The clovers, on the other hand, are capable of readily acquiring their mineral food, both because of their large root systems, and because of the character of the roots. They, however, differ in one very important particular from the cereals and grasses, in that under proper conditions, they are capable of acquiring their nitrogen from the air. Thus with liberal dressings of only phosphoric acid and potash, maximum crops may be secured. They are “nitrogen gatherers,” and the tendency of their growth is to improve the soil for the nitrogen consumers, or for those that obtain their nitrogen only from soil sources.

Another group of crops is distinguished as a class, not so much because of their peculiar habits of growth, as because of the objects of their growth, though this latter fact has a very important bearing upon economical methods of fertilization. This class includes what are called “market-garden crops,” as lettuce, beets, asparagus, celery, turnips, cucumbers, melons, sweet corn, beans, peas, radishes and various others. The particular object in raising these is to promote rapidity in growth and thus to insure high quality, which is measured by the element of suc-

culence. In order that this may be accomplished, they must be supplied with an abundance of available plant food of all kinds, and since nitrogen is the one element which more than any other encourages and stimulates leaf and stem growth, its use is especially beneficial for all of these crops. They must not lack for this element in any period of their growth, though, of course, a sufficiency of minerals must be supplied, in order that the nitrogen may be properly utilized. Because of their high commercial value, the quantity of plant-food applied may be greatly in excess of that for any other of the groups, and profits, as a rule, are measured by this excess rather than by the proportion of the elements.

It is shown in experiments conducted by the Experiment Station, that in the case of forage crops, rye, wheat and millet, which utilized the nitrate quite as completely as the market-garden crops, the increased value of crop due to the nitrate does not exceed \$14 per acre, or at the rate of \$8.50 per 100 pounds of nitrate, while in the case of the market-garden crops, celery, cabbage, cucumbers, melons, etc., the value of the increased yield reaches in one instance the high figure of over \$263 per acre, or at rate of about \$66 per 100 pounds of nitrate. The nitrate used was no better in the one case than in the other, but in the case of the forage, the plant required a larger amount of nitrogen to make a unit of crop, than in the case of the market-garden group, besides, it possessed a high market value—it was at best crude animal food, while the other possessed a high market value—it was a perfected human food. These relations of cost of material applied to value of crop, have been pointed out from time to time and deserve to be emphasized and repeated in order that we may not be misled or disappointed in the results obtained from the use of high-grade fertilizing materials.

Because of these differences in crops in respect to their profitable utilization of fertilizer constituents, the following general rules as to the use of high-grade and low-grade materials have been suggested:

Upon quick-growing crops of high market value, use an abundance of high-grade fertilizing materials, containing immediately available constituents.

Upon slow-growing crops of low market value, use cheaper fertilizing materials, whose constituents are slowly made available, and depend upon unused residues from the application to previous crops for the increased yield.

The right idea is embodied in these rules, though there are exceptions to them. It is possible to get a relatively large money return from the use of high-grade materials upon crops of low commercial value, and this is particularly true in the case of forage crops, even though no value is attached to the virtual decrease in area required for a definite product, or to the improvement in the quality of the crop.

Another distinct class of crops, though differing materially in their individual growth, are the fruits. These differ from most other crops, in that a longer season of preparation is required, in which the growth may be so directed as to prepare the plant or tree for the proper development of a different kind of product, namely, fruit, as distinct from grain or seed in the cereals, or succulence in the vegetable crops. The fruit differs in its characteristics from the ordinary farm crops, in that its growth and development require a little different treatment, since it is necessary that there shall be a constant transfer of nitrogen from the tree to the fruit throughout the entire growing season. The growth of each succeeding year of tree and fruit is dependent, not altogether upon the food acquired during the year, but as well upon that acquired in the previous year, and which has been stored up in bud and branches. A knowledge of the habits of growth, the period of growth, and the object of the growth of this class is, therefore, useful as a guide to the economical supply of the essential elements of growth. These crops must be provided with food that will encourage a slow and continuous, rather than a quick, growth and development.

The principal lines of development of our farming here pointed out, are certainly worthy of a careful consideration, not only, but of our best thought and study, in order that we may acquire thereby more definite knowledge, for a right knowledge of principles underlying, and an appreciation of their relation to the business and home side of farming, will engender hope, and hope will develop courage and confidence, and these rewarded give

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enthusiasm, and this is what is required, in order that we may be happy and successful in our work. Let us bend every energy by the right application of principles to make our business successful—it will then be popular, and a popular business will draw not only capital and labor, but that consideration from others as will tend to dignify our calling, which the immortal Washington designated “the most healthful, most useful and most noble employment of man.”

NEW JERSEY STATE LIBRARY

**Report of
State Board of Agriculture.
Year 1903.**

FRANKLIN DYE, SECRETARY.

General Survey of Crop Conditions for 1903.

BY THE SECRETARY.

Not for many years has nature dispensed so many unseasonable and extreme changes as have been experienced during the agricultural year now closed. And these changes, many of them adverse to successful crop production, have seriously reduced the usual and ordinary profit of a majority of our farmers. While this loss is felt to some extent by all, it is serious to those who are heavily in debt for their farms and their equipment, and those who are renting or working farms on shares.

The unusual behavior of the weather began in the month of March, which was unusually mild, so much so that vegetation was advanced unduly for that time of the year. Following this, April came in with a compromise of March and April weather, March weather predominating.

These two misplaced extremes injured early set tomatoes very extensively in localities devoted to this product. More than one hundred thousand plants were destroyed in Gloucester county alone. Strawberry bloom was also injured, and the peach crop reduced 50 per cent. Frost occurred in nearly all sections May 2d, and ice formed in Mercer and Sussex counties a half inch in thickness.

Following the extremes named, a period of dry weather, a veritable drought, set in, which extended into June. This, with the preceding frost, further reduced peaches, strawberries and early market garden crops; also wheat and grass, and greatly retarded corn planting; the ground being too dry and hard to successfully break it up so as to properly fit it for the seed; even where heroic measures were taken to do this, and the corn was planted, there was not moisture enough in the soil to cause germination.

The temperature at times, during this period of drought, reached eighty-five to ninety-five degrees. The total rainfall for the month of May is the least total for that month recorded by the New Jersey Section of the United States Climatic and Crop Service. This protracted drought was seriously felt by the dairy interests of the State also, requiring the purchase of costly feeds for their maintenance.

Copious rains on June 11th and 12th revived drooping vegetation; and belated farm work, such as planting corn, transplanting cabbage, tomato and sweet potato plants, was pushed forward; but all melon crops, late tomatoes, lima beans, potatoes and peaches, favored during this period in their earlier growth, were very seriously injured by a drop of from four to six degrees in temperature below the daily normal about the middle of August.

Both days and nights were unusually cool, and heavy rains throughout the central and southern portions of the State, especially a heavy storm on the 25th of August, made the conditions still more unfavorable, so that the bloom of melons and tomatoes was seriously injured; lima means generally moulded, peaches rotted on the trees and potatoes rotted to such an extent, in some localities, that entire fields were not considered worth digging. Acres of corn planted late could not be cultivated, owing to the wet condition of the ground, and late cabbage rotted so badly in some localities that only a limited number produced marketable heads.

As though not satisfied with the adverse conditions previously wrought, nature, on October 9th, sent a deluge of rain and wind unsurpassed in its magnitude and serious effects, by any storm of recent years. While many industries and transportation companies were seriously impaired, the farmers' remaining crops were greatly injured or totally destroyed. This was especially the case with corn—whatever of doubtful promise it had previously given was laid low by this storm, and both fodder and grain were damaged beyond recovery. Most late fruits were shaken from the trees and their market and keeping qualities greatly reduced.

The generally adverse conditions named will be seriously felt by more farmers in the northern half of the State than by those in the southern portion. Except for those in the dairy business in the former section, the outlook is not so encouraging as last year; as the peach crop, corn, oats, buckwheat and hay were all injured. In the market garden sections of the southern half of the State, flattering returns rewarded some of those engaged in the production of such crops and fair rewards came to most of them.

It is always wise to plan so as to prevent disaster; but efforts to do this are usually made on the basis of past experience. Sometimes, however, nature exceeds her previous records, as was the case during the past year, and no human foresight could successfully plan to prevent, much less overcome, such devastation as was experienced.

The farmer may, indeed, adopt methods of cultivation that will measurably overcome the evil effects of a short drought. He must also provide good seed and the needed portion of plant food, of the right kind, and give the cultivation necessary. But conditions that will enable him to plant at the right time, that will furnish moisture enough to cause the seed to germinate and grow and make the plant food available, he may not be able to control to his satisfaction. So it comes to pass that what "can't be cured must be endured," in the hope that the next and subsequent years may be more favorable to all those who have suffered in this.

Table I. will show the yields of the crops there reported for this year with the value of each and the total. Table II. the yield for 1902 and the reduced yield in 1903 as compared with 1902 and the reduced value.

These several crops show a total reduction in money value below 1902 of \$4,554,153.

As the loss sustained in other crops by rots, blights and other causes has been heavy, especially in miscellaneous vegetables and orchard fruits, a conservative reduction in these crops below last year's report is made of \$1,914,803, giving a total decrease of \$6,468,956 below last year.

Now, no deduction from the foregoing statement of actual conditions will warrant the conclusion that the farmers, as a class, are pessimists. While they enjoy their meed of prosperity as well as workers in other callings do, they are equally hopeful when conditions beyond their control are against them.

Let us now turn to the more encouraging side of the situation.

CROP YIELDS FOR 1903.

The actual yields of the cereals, hay and potatoes for the year 1903 are fairly stated in Table I. The yield per acre of the crops named is placed at: Corn, 20 bushels; wheat, 12 bushels; rye, 11 bushels; oats, 26.5 bushels; buckwheat, 12 bushels; hay, 1 ton; white potatoes, 114 bushels; sweets, 80 bushels.

The price of corn is given at 56 cents; wheat, 80 cents; oats, 35 cents; rye, 60 cents; buckwheat, 70 cents; hay, timothy and mixed, average \$14 per ton; white potatoes, 68 cents; sweets, 75 cents.

The total value of the above-named crops for 1903 is \$16,868,242. Allowing the wholesale price of milk to be the same as in 1902 (same yield) which is \$9,325,688, and deducting \$914,803 from miscellaneous vegetables and \$1,000,000 from the value of orchard fruits as reported last year in the Census figures, would give an income of \$12,259,122 from the various products included in Table II., and a total for the year of the cereals, hay, potatoes—white and sweet—milk and products enumerated in Table I. of \$38,453,050.

I have made no reduction in the estimate of small fruits, believing that losses that may have come to the strawberry crop, will be fully compensated in the general returns by the excellent yield of cranberries. Conservative estimates place this crop in New Jersey at 400,000 bushels, approximating a value of \$1,000,000 for this one crop in New Jersey for 1903.

Table III. shows the reduction in yield of the crops named in 1903, and the reduced value at prevailing prices.

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TABLE I.

<i>Crop.</i>	<i>Acreage.</i>	1903	
		<i>Yield.</i>	<i>Value.</i>
Corn,	292,770	5,855,400	\$3,279,024
Wheat,	106,004	1,274,448	1,018,558
Oats,	67,852	1,798,078	629,327
Rye,	68,615	754,765	452,859
Buckwheat,	13,404	160,848	112,593
Hay (tons),	408,081	* 408,081	5,713,134
White Potatoes,	57,113	6,510,882	4,427,467
Sweet Potatoes,	20,588	1,647,040	1,235,280

TABLE II.

*Clover and Grass Seed,	\$2,795
Miscellaneous Vegetables,	4,000,000
*Dry Beans and Peas,	6,754
*Onions,	105,327
*Small Fruits,	1,406,049
*Grapes and their product,	81,758
Orchard Fruits, with Cider, Vinegar, etc.,	1,594,981
*Flowers and Plants,	1,953,290
*Seeds,	43,191
*Nursery products,	339,926
*Nuts,	20,660
*Forest products,	469,005
*Poultry and Eggs,	2,204,120
*Wool,	31,266
*Milk—total product, 77,714,055 gallons, at 3 cents per quart,...	9,325,686
Total value, 1903,	\$38,453,050

TABLE III.

<i>Crop.</i>	<i>Yield, 1902.</i>	<i>Reduced Yield</i>	<i>Reduced Value</i>
		1903.	1903.
Corn,	10,245,950	4,390,550	\$2,458,708
Wheat,	1,696,064	421,616	337,292
Oats,	2,374,820	576,742	201,859
Rye,	1,125,286	370,521	222,312
Buckwheat,	301,590	140,742	98,519
Hay (tons),	408,081	.....	* 408,081
White Potatoes,	7,538,916	1,028,034	657,941
Sweet Potatoes,	2,038,212	864,296	648,222
	<i>Value.</i>	<i>Value, 1903.</i>	
Miscellaneous Vegetables, ..	\$4,000,000	\$4,914,803	914,803
Orchard Fruits, with Cider, Vinegar, etc.,	1,594,981	2,594,981	1,000,000
Total value of reduced yield, 1903,			\$6,649,737

* Same as 1902.

In the foregoing calculations no estimate has been made of the value of animals—swine, veal, calves, lambs and beef—sold on the hoof or slaughtered, as no data is available for computing their value; but it is a large sum. The Census value of our 34,650 farms and their equipments is \$195,359,106. Proportionate value of each farm is \$5,638. Proportionate value of the earnings of each farm for 1903 is \$1,109.08. Deducting interest at 5 per cent. on farm value is \$281.90, giving a gross income per farm of \$827.18.* From this gross income must be deducted taxes, hire and repairs. These vary according to the requirements in each case.

Number and Value of Live Stock on Farms in New Jersey, February, 1904, taken from the Crop Reporter of the United States Department of Agriculture, Hon. John Hyde, Statistician. Inserted here for reference.

	<i>Number.</i>	<i>Value.</i>
Horses,	95,230	\$9,454,882
Mules,	5,024	493,413
Milch Cows,	179,241	6,997,569
Other Cattle,	82,061	1,668,489
Sheep,	44,685	182,439
Swine,	154,069	1,748,683

DIRECTORS' ANSWERS TO QUESTIONS SENT.

To our questions sent to the Directors of the State Board of Agriculture, the one "Are the average good farms being run at a profit?" Essex, Hunterdon, Morris and Union reply: "Not this year"; Mercer, "A small profit"; Gloucester, Salem and Warren say "Yes," but do not give a per cent., while Atlantic, Bergen, Burlington, Camden, Cumberland, Cape May, Middlesex, Monmouth, Ocean, Somerset and Sussex give a per cent. of profit which averages 5 per cent.

To the question: "What causes, if any, are injuring the popularity and prosperity of agriculture in New Jersey?" Seven-

* Since writing the above I learn that the Department of Labor and Commerce has made a record of income and expenses of 2,567 families in all parts of the country, showing the total family income average to be \$827.19; expenses, \$768.54.—*Rural New Yorker*, December 5, 1903.

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teen answers give prominence to the scarcity and high price of farm laborers. Three suggest "The tendency of farmers' sons to leave the farm in order to get rich quickly." One says, "Competition from the South and West and higher cost of living." Three suggest "taxes" are burdensome.

One says: "As a State and Nation we have encouraged invention—that demands manufacture and mercantile activities. This requires humanity to act; being a nation of emigration and liberty, we have made an abnormal growth. During many years agriculture was in the lead, happiest homes were at the hillside. The invention and use of electricity, during the past ten years, with its multitudinous demands supported by hundreds of millions of dollars of gold and silver, has brought to the world a demand for men, women and children that can use our language fairly, beyond any estimate yet made; also the fields of insurance, banking, sewage, stone roads, grading, repairing and keeping the homes of luxury and magnificence as a park system about our State. These, with many other similar demands, may be the source or cause of a lack of popularity in agriculture through our State and Nation. Surely there is a lack of interest among all classes of society cultivating the soil, and yet the cultivation of the soil is the basis of all activities—social, intellectual, moral, &c."

REMEDIES SUGGESTED.

To the question, "What remedy do you suggest?" one says: "Good roads, equal valuation of property"; another, "Farmers should know more about their business and have more enthusiasm in their work"; another, "Educate and keep our boys on the farm, for intelligent labor produces more profit." Another, "Better practical education in our country schools, an effort on the part of farmers to make the children respect and love the country home and rural life, show them that farming is profitable, if rightly followed."

Another, "Education along agricultural lines, rural telephones," and two say, "More trolleys, cheaper transportation." Another, "Better grading, packing and distribution of farm pro-

ducts." Three suggest "Organization and co-operation, especially for securing help."

Another says, "Make home more attractive for the boys and keep them from going to the towns to work. Attend agricultural gatherings and learn what you can there. Cultivate sociability in your neighborhood, make home life pleasant. Show a disposition to do unto others as you would be done by, and, finally, be a good citizen."

Another, "It may be no remedy can at present be introduced that will attract to the soiled hand, irregular footstep, many hours, &c., required for the successful agriculturist." One says, "More farmers to make our laws." Another, "Legislation in the interest of farmers."

Another, "The farmer himself stands in the way of prosperity and popularity of his business. When the farmers take hold of their business in a business way and improve the opportunities that surround them, then they will prosper and make money. Not until this takes place will the farmers regain their popularity. There has been some improvement and I am looking for more. In this part of our county I can see a marked change for the better in the last year or two. I feel that the State Board of Agriculture must push on its work, as the improvements made are largely due to it."

The remedial suggestions of our correspondents are of varied importance, and their introduction will depend largely upon the farmers themselves. The farmers must take a general and united interest in the improvement of rural schools and, where legislation for this purpose is necessary, they should unite in securing it.

The farmer alone can improve the home in its inner, everyday social and intellectual life. In these days of good and cheap magazines and books there is no excuse for their absence from the farmer's living room. The same is true of music. Parents, too, should be companions of their children. The social life of the home, if right, is an enduring tie. The farmer's home surroundings should also be attractive, inviting, cheering to himself, his wife, his children. He must also so arrange his farm work

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by intelligent direction and suitable reward that at least some of the boys will be satisfied to follow the farming profession.

The farmer, too, must look after his local taxes, his freight and transportation matters, grading and marketing of his produce and general and local organizations. Those engaged in other professions have their own peculiar difficulties to meet and surmount. No trade, no calling is free from these, and farmers should not expect exemption from the common lot.

FARM HELP.

The foregoing replies to our questions are suggestive. The difficulty of procuring efficient farm help, sufficient for the demands and with qualifications to do farm work that compares with prices demanded, is the chief difficulty at present. A change in industrial conditions will, no doubt, remedy this in time. For our rapidly-increasing force of foreign laborers cannot be always employed at railroad building and in the manufactories.

The product of the latter, with improved machinery, must exceed the demand in due time, and the surplus of laborers will of necessity take to the farms for employment and a living. It may be of interest in this connection to refer to some facts relating to our present immigration, as shown by our late United States Census, as it affects New Jersey.

* "Earlier immigration to this country was chiefly from north-western Europe and was mainly English-speaking; recent immigration is chiefly from southern and southeastern Europe, and the great majority of these do not speak English. Of the fifty-two States and Territories specified in the Census, fifteen exceeded New Jersey in population, but in only eight of the largest were there more foreign-born inhabitants.

"Between 1890 and 1900 there was a greater proportionate increase of the foreign-born population in New Jersey than in any other State of the North Atlantic Division. The average increase for the whole United States was twelve per cent.; for the North Atlantic Division, twenty-two per cent.; for New Jersey,

*Extracts from a leaflet prepared by the Committee on Synodical Home Missions of the Presbyterian Church in New Jersey. Drawn from the United States Census of 1900 and other sources.

thirty-one per cent. More than one-tenth of the net increase of the whole country for the decade was in New Jersey alone.

"Of the immigration from 1900 to 1903, inclusive, more than 100,000 have come to New Jersey. In the year 1900, of the total population of New Jersey, more than half (fifty-two per cent.) were either foreign-born or descended from parents, one or both of whom were foreign-born; of the total males of voting age, only forty per cent. were of native ancestry; four per cent. were colored; twenty per cent. were born here of foreign-born parents, and thirty-five per cent. were born outside of the United States.

"In the year 1900 the foreign population was distributed over the State as follows:

TABLE A.

Hudson,	121,702	Somerset,	5,902
Essex,	97,340	Burlington,	4,519
Passaic,	57,820	Cumberland,	4,273
Union,	24,074	Warren,	2,921
Middlesex,	22,874	Gloucester,	2,542
Bergen,	20,247	Hunterdon,	1,714
Mercer,	18,955	Sussex,	1,536
Camden,	14,010	Salem,	1,380
Morris,	12,261	Cape May,	1,203
Monmouth,	8,645	Ocean,	1,083
Atlantic,	6,885		

"The distribution of the later immigration in which a thousand or more of any of these nationalities are found, is shown by counties in Table B. The countries named are those of birth:

TABLE B.

<i>Counties.</i>	<i>Italy.</i>	<i>Hungary.</i>	<i>Austria.</i>	<i>Russian-Poland.</i>	<i>Russia.</i>
Essex,	11,896	1,563	4,326	1,560	5,877
Hudson,	9,646	945	3,306	2,272	4,592
Passaic,	5,798	3,959	2,683	1,147	2,422
Bergen,	2,055	245	509	365	362
Atlantic,	1,828	100	58	54	259
Mercer,	1,701	1,516	264	469	777
Morris,	1,390	1,039	250	230	202
Union,	1,608	322	695	402	1,251
Somerset,	1,317	161	575	111	160
Cumberland,	1,054	23	88	42	754
Middlesex,	709	3,926	1,422	1,341	981

"Taking the official figures for the years ending June 1st, 1900, 1901 and 1902, and making a conservative estimate for 1903, in these four years there have come to New Jersey about 10,000 Germans, 13,000 Slovaks, 15,000 Magyars (Hungarians), nearly 20,000 Poles and over 20,000 southern Italians.

"Of the more than 75,000 of all nationalities that came into the State in the first three years named, about 250 were classified as professional, over 8,000 as skilled laborers, about 9,000 as farm laborers, over 30,000 as common laborers, and about 20,000, including women and children, were unclassified.

"The proportion of men to women was about two to one. In the case of the Italians it was three to one.

"The recent immigrants are generally poor. A large proportion cannot read or write in any language. They locate chiefly in cities, and are engaged in factories and as day laborers."

The foregoing figures show that New Jersey is receiving and *retaining* more than her proportion of the foreign-born additions to our country's population. Enough, it would seem, to solve the labor problem for all our industries. But, only a few thousand of this vast army are classed as farm laborers; and, for farm work in New Jersey, they have much to learn before they can be efficient, and even then there would be but about one man to four farms.

While we, as farmers, are looking at the labor problem, chiefly, from the view point of *our needs*, should we not also consider our responsibility in the important work of improving and Americanizing these people. They are with us fifty per cent. strong and more are coming. I am sure our farmers can have a mighty influence, and, having their attention drawn to it, will try to direct and encourage these strangers into channels of good citizenship.

FRUIT AND VEGETABLE CANNING IN NEW JERSEY.

The vegetable and fruit canning industry is the subject of a chapter of much interest in the report of the New Jersey Bureau of Statistics for 1903.

The capital invested shows a large increase over that of last year, and the product of canned goods of all kinds is much greater than it has been in recent years. This is owing to the fact that the supply of material has been more abundant, and, generally speaking, of a very superior quality.

The fruit and vegetable crops of the varieties used for canning were very plentiful, and the factories were run to their full capacity. The number of establishments in operation during the season of 1902 was fifty-two, an increase of six over that of 1901. The new establishments are all situated in South Jersey. So far as could be ascertained the fruit and vegetable growers of the sections in which the canning factories are located found ready and liberal buyers for all of their crops that were not sent fresh to the ordinary markets.

The canning facilities were, apparently, equal to handling all the material turned in to the factories, and the prices obtained for the product being equal to those of the year before, when the crops were comparatively scarce, it may be reasonably assumed that there is still an opportunity for a large expansion of the business through the farmers and canners co-operating to that end.

The geographical location of the canneries is the same as last year* but there is an increase of one and five establishments in Burlington and Salem counties respectively.

Of the total number of canneries one, situated in Burlington, handles fruit alone; fourteen handle both fruit and vegetables, and thirty-seven put up vegetables only. The main points of interest in the condition are shown in the following table:

	1901.	1902.	Increase.
Number of canneries,	46	52	6
Capital invested,	\$873,195	\$1,035,482	\$162,287
Number of persons employed—			
Male,	2,094	2,891	797
Female,	3,920	4,470	550
Total,	6,014	7,361	1,347
Total amount paid in wages,	\$267,828	\$367,100	\$99,262
Selling value of product,	\$1,320,886	\$2,164,299	\$843,413
Aggregate number of days in operation, ..	2,643	3,468	824

*See Agricultural Map in Annual Report of State Board of Agriculture 1902-03.

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The percentages of increase in the above items are as follows:

Number of canneries,	13.0 per cent.
Capital invested,	18.6 per cent.
Number of persons employed—Male,	38.0 per cent.
Female,	14.0 per cent.
Total amount paid in wages,	37.1 per cent.
Selling value of product,	63.9 per cent.
Aggregate number of days in operation,	31.2 per cent.

A comparison of the quantities of goods canned for both years, which is given in the table below, shows a large increase of product for 1902. This applies to the greater number of articles, including all the principal standard goods. In some few varieties of vegetables and fruit a decline is shown, but the amounts are, for the most part, small when compared with the increases in other lines. To simplify the comparison the goods put up in two and three-pound cans are reduced to pounds, and the dozens of gallon cans to units:

VEGETABLES.

	1901.	1902.	Increase.
Tomatoes, pounds,	27,308,064	43,762,380	16,454,316
gallons,	725,172	1,275,864	550,690
Green Peas, pounds,	4,348,536	5,994,280	1,645,752
Lima Beans, pounds,	3,476,208	5,473,224	2,051,015
Asparagus, pounds,	25,200	74,160	48,960
Pumpkin, pounds,	1,013,236	1,343,304	330,068
gallons,	40,104	85,896	45,792
String Beans, pounds,	100,152	19,032	81,820 (dec.)
Sweet Potatoes, pounds,	1,308,888	377,468	931,422 (dec.)
Beets, pounds,	50,400	3,312	47,088 (dec.)
Squash, pounds,	43,200	518,076	474,876
gallons, .....	.....	17,472	17,472

FRUITS.

Strawberries, pounds,	172,968	158,248	14,720 (dec.)
gallons,	153,192	42,252	110,940 (dec.)
Pears, pounds,	1,283,844	1,405,900	122,846
gallons, .....	.....	6,000	6,000
Blackberries, pounds,	18,816	143,112	124,296
gallons, .....	.....	10,140	10,140
Raspberries, pounds,	3,168	24,500	21,332
gallons, .....	.....	49,368	49,368

	1901.	1902.	Increase.
Cherries, pounds,	2,880	8,208	5,328
gallons,	4,212	17,556	13,344
Peaches, pounds,	1,188	20,880	19,692
gallons,	10,372	7,800	2,572 (dec.)
Pineapple, pounds,	900	720	180 (dec.)
Apple, pounds,	7,200	156,420	149,220
gallons,	21,732	22,836	1,104

The above table shows that the quantities of tomatoes, green peas, lima beans, asparagus, pumpkins and squash packed in three and two-pound cans had increased 19,891,352 pounds in 1902 as compared with the product of 1901. Of the same goods the increase in the quantities put up in gallon cans was 613,956 gallons.

In fruits the increase in the quantities of pears, blackberries, raspberries, cherries, peaches and apples packed in two and three-pound cans was 442,714 pounds; the net increase in the number of gallons of the same fruits was 79,956 in 1902 as compared with the previous year.

During the same period the product of strawberries put up in cans decreased 14,720 pounds, and in gallons the falling off was 110,940. There was also a slight decrease in the number of gallons of peaches and pounds of pineapple.

The total amount of vegetables put up in two and three-pound cans in 1901 was 37,673,884 pounds; the total quantity so put up in 1901 was 57,565,236 pounds, an increase of 52.8 per cent.

In 1901 the product of gallon cans of vegetables was 765,276, and in 1902 it had risen to 1,379,232, an increase of 80.2 per cent.

The fruit product packed in two and three-pound cans in 1901 was 1,490,964 pounds; in 1902 it was 1,917,988 pounds, an increase of 28.7 per cent. The fruit packed in gallon cans shows a falling off in 1902 as compared with 1901. In the last-named year the product was 189,508 gallons, as against 155,952 in 1902, a decrease of 21.5 per cent.

COUNTY BOARDS OF AGRICULTURE.

The County Boards of Agriculture auxiliary to the State Board are nineteen. All the counties are organized except

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Passaic and Hudson counties. Each of these Boards is maintaining its organization with a degree of usefulness measured only by the interest of the farmers.

That they are capable of doing much to improve practical agriculture, is abundantly proved by the history of many of them. Through these, also, the farmers express their views and wishes in relation to the more general questions of road improvement, school management, the fish and game laws, &c.; and it would be of mutual benefit if farmers generally would take advantage of these organizations.

The Executive Committee of the State Board is making a special effort this year to bring into active co-operation the Directors of the State Board in the several counties and the officers of the agricultural organizations, recognized by law, with the Executive Committee, for the improvement of the agricultural industry; and, in this way, to increase the popularity of the agricultural business and enhance the value of our farming lands.

INJURIOUS INSECTS.

For years the farmers have had to contend with hordes of injurious insects of different kinds. Few, if any, crops are exempt from assault. This has been and is an added expense to the usual cost of crop production.

One very serious setback to the fruit interests of the State is the San José or pernicious scale. Progressive farmers are working heroically to keep it in check and subjugate it, if that can be done. Others are indifferent to its ravages, even though their neglect to use the means advised for its destruction may cause great injury to their neighbors.

For delinquents that may require arbitrary measures to bring them to a sense of duty in this particular, the law, Chapter 249 of 1903, makes provision.

Acting under that law, and to meet the requirements, particularly of Section 12, the Executive Committee of the State Board of Agriculture, on May 7th, 1903, appointed a Committee of Appeal consisting of Hon. William H. Reid, Monmouth county;

Charles Collins, Burlington county, and Cyrus B. Crane, Essex county.

The State Entomologist, Prof. John B. Smith, says:

"The State Entomologist has, during the summer and since the enactment of the new Inspection Law, made a very thorough canvass of the State to locate growers of nursery stock, and over fifty nurseries of various size have been thoroughly inspected. As a result thousands of trees unfit for sale have been destroyed, thousands of others have been sorted over to clean out infested stock, and large blocks have been thoroughly fumigated. Others have been refused a certificate and cannot be lawfully sold. It is not too much to say that the horticulturists of the State, buying from their own nurseries this year, will receive better and cleaner stock than at any time for nearly a decade past.

"But while nurserymen have been held to a strict compliance with the law, they have been assisted in clearing up dangerous surroundings, and several orchards badly infected by the pernicious scale have been taken out or treated under the direction of the Entomologist. Fruit growers are gradually awakening to the importance of the matter and now evince a disposition to co-operate with rather than oppose the efforts to lessen insect injuries.

"The efforts to introduce the Chinese Lady Birds have been continued and the two colonies at New Brunswick increased to such an extent during the summer that they were divided and distributed to sixteen different points. In all cases they reached their destination in good condition and were afterward noticed feeding upon the scales they were intended to control.

"Mr. E. L. Dickerson, of Newark, has served as assistant to the Entomologist during the entire year."

(For full report see Report of State Entomologist in this volume.)

FEEDING STUFFS LAW.

The Feeding Stuffs Law has been under the supervision of Dr. Edward B. Voorhees, who says:

"The brands of feed examined this year are represented by 233 official samples, and the fulfillment of guarantee is identical

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with last year. The dairymen and feeders of the State are now benefiting by a law providing a feed inspection, as on the whole it is effective in preventing the sale of spurious articles, for while there are a few adulterations and many innocent contaminations, it is a matter of congratulation, in a season when feeds have been high and scarce and farmers have been obliged to buy through the exhaustion of their own stores of fodder, that no great departures from normal composition have been noted.

"It is still further gratifying, that no stock was found for sale regarded as distinctly low grade, furnishing less than 7 per cent. of protein, which were designated last year as 'feed substitutes,' and furnished the matter for a special bulletin of warning.

"The analyses of the various samples, and their discussion, are reported in bulletin No. 165 of the Experiment Station, which bulletin has been highly commended by the representatives of the feed journals as well as the feed trade of this and other States."

LECTURE WORK.

The lecture work of the Board was carried on during the fall and winter of 1902-03 in different parts of the State at twenty-seven Farmers' Institutes, as also at the Annual Meeting of the Board in January. These meetings gain in popularity and usefulness. That they are appreciated by our farmers is shown by their attendance and their written and verbal testimony. For the present November and December, and January, 1904, a similar number of meetings have been arranged for.

The Annual Meeting of the Board is composed of our leading farmers, and it seems to gain in strength and usefulness each succeeding year. The Executive Committee endeavor to confine the addresses and discussions to the advancement of practical agriculture and related matters. The proceedings of this meeting, with the reports of the several allied departments, constitute the annual report.

This has an increasing demand. The edition of 1903 is practically exhausted. That these reports have a permanent value is shown by the widespread and continuous demand for back numbers.

For the forthcoming volume, in addition to the usual material, an exhaustive, yet concise, article on the production of sweet potatoes has been prepared. This industry is growing to such an extent in New Jersey it has become a leading one, and the quality of the product is of such a high order they are denominated in the outside markets "Jersey Sweets."

DISEASES OF FARM STOCK.

The general condition of farm stock throughout the State compares well with 1902.

The report of the Commission on Bovine Tuberculosis is herewith presented. The Commission request that a sufficient number of copies of their report be printed for use of the Legislature, soon to convene, as the annual report of the Board may not be ready in time for this purpose.

The report of the State Board of Health concerning glanders, anthrax and other diseases of farm stock, which are committed to that department, will be published with our annual report.

CRANBERRY PRODUCTION.

The following report on Cranberry Production in New Jersey was presented by Mr. A. J. Rider, Secretary of the American Cranberry Growers' Association:

My subject has been named by your Secretary and I shall endeavor to shape my remarks to fit it.

Scientists have given us no reliable information as to the date of appearance of the cranberry on this mundane sphere, but as the cranberry is a sort of semi-aquatic plant, it is fair to presume that as the waters receded from the face of the earth, the cranberry plant first lifted its head and bore fruit, and I challenge proof that the monkey didn't grow into a man from eating spring cranberries.

I shall not claim for it any credit or responsibility for that little episode in the Garden of Eden, for it is a fruit never for-

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bidden under any circumstances. Eve would undoubtedly have preferred cranberries, but she didn't want to get her stockings wet; and besides, the Garden of Eden was not then located in New Jersey (as now), where the choicest cranberries grow.

We may say that cranberries have been produced in New Jersey from time immemorial, but as to cultivation we are now down to about the third generation of growers. In other words, our grandfathers were the pioneer cultivators.

They began in a very crude way and on a small scale. A few succeeded; many failed. Like all new enterprises, it was a grope in the dark. No one ventured very far. Only small patches were planted, with any thing so it was a cranberry vine.

A few noticeable successes, due more to favorable conditions than to methods of culture, led to greater ventures. Still the successes were largely in the minority and it came to be considered a very precarious business.

But the American spirit of perseverance and push and "What one has done another can do" has led to a wonderful development of this industry. Where we once saw small areas of one to five acres devoted to the cultivation of this fruit, we now see plantations of 50 to 500 acres.

About 10,000 acres of land in New Jersey are devoted to the cultivation of this fruit, and the annual crop may now be counted at 400,000 bushels, and the revenues of the State increased thereby about \$800,000. The invested capital may be safely placed at \$2,000,000. It should not be forgotten that, if these 10,000 acres of land, devoted to this industry, ever had any value previously, it had never been discovered.

Probably in no section has this industry received more scientific study and attention than in New Jersey, and this from individual enterprise and push, rather than from public aid or assistance. Both State and National Scientific Departments have cheerfully responded when specific aid was asked in the combat of some enemy or disease, but no financial aid has been extended or asked, as in other States, noticeably Wisconsin.

The more practical problems have been worked out by individual growers and their self-supported Association.

The names of Brakeley, Fenwick, Budd, White and Durell will always be associated with the successful development of the cranberry industry in New Jersey, as will the names of Makepeace, Small and Briggs on the Cape.

I notice that the Secretary of the State Horticultural Society reported last week that the cranberry crop of New Jersey would aggregate 500,000 bushels for the past season.

In the absence of statistical figures, which are not yet completed, I am not disposed to question this statement, but I am disposed to differ with him as to the necessity for the repeal of the Chinese exclusion law, that we may secure more cranberry pickers. Yankee ingenuity is equal to any emergency and "Necessity is the mother of invention." Mr. Budd is probably not aware that at least one-half of the cranberry crop of the country is now harvested otherwise than by hand, and with improvements in progress on picking appliances the crop will continue to be harvested without importation from China.

My subject would not be covered should I fail to direct your attention to the quality of the fruit grown in New Jersey. In this respect, as well as to quantity, New Jersey has come to the front. One would judge from Eastern market reports that New Jersey had the left of the line and brought up the tail of the procession. This is due to the fact that the author of these reports has not been able to extricate himself from the proverbial rut.

Jersey-grown cranberries, of the leading varieties, command the highest prices in the market, but she doesn't get the credit near home. Many of these varieties, having originated on Cape Cod, has led to the practice of quoting them as Cape Cods without regard to where they were grown. In the West, where the bulk of the New Jersey crop finds its market, the tables are turned. For instance, two leading Chicago journals, the Fruit Trade Journal and the Packer, contained these quotations just before the holidays: "Cape Cod, per bbl., \$5 to \$8; Jersey, per bbl., \$6.75 to \$10.00." "Cape Cod, \$4.50 to \$8.00. Jerseys, \$6.50 to \$10.00." This speaks not only for the quality of the fruit, *per se*, but for its superior carrying quality and its packing. Some years ago the most extensive growers in New Jer-

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sey entered into an agreement that the fruit grown by each should be hand assorted and uniformly packed, with no topping and with the grower's name stenciled or stamped on each package as a guarantee. This has undoubtedly had much to do with the growing popularity of Jersey fruit.

It will be of interest to note that early cultivators and writers on the subject knew but three varieties of cranberries, the Bell, the Bugle, and the Cherry. These were distinguished by the shape only. This classification at the present day would be about on a par with a classification of apples as red, white, and russet apples. Scores of varieties have been developed, differing in color, size, shape, firmness, gloss, flavor and productiveness, and the expert cultivator has no difficulty in distinguishing both plants and fruits of the leading varieties.

These qualities have been kept steadily in view by growers, and they are reaping their reward in good prices, while mixed varieties are slow of sale.

On the whole, the season for New Jersey growers has been a satisfactory one. The quantity and quality have been all that could be desired, and prices have been remunerative and the bulk of the crop sold.

By this it should not be inferred that the path of the cranberry grower is strewn with roses. New enemies are constantly rising up, which must be met and overcome, and besides, with every material increase of the crop, the old ghost of over-production looms up, and it is quite probable that the problem of better distribution and extended markets must be met and solved.

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BY DAVID M. KELSEY AND H. W. COLLINGWOOD.

Mr. Kelsey—The production of hay has been attended with as large a measure of success where persons have specialized in it as any other. The figures for the United States production are \$600,000,000. There are only two other crops whose figures amount to this—those of corn and cotton. And mark you! those two are export crops, and hay is not.

We must begin to inject method into the production of this crop, which is so important. You are familiar with the intensive method of raising hay in my native State, known as Clark's Grass Method.

Mr. Clark does not claim to be the originator, but he has done a great deal of good in disseminating the method which, I believe, originated with the late Phineas M. Auger some twenty odd years ago, ten years before Mr. Clark began. It originated with the fruit men of Connecticut, under the term of Thorough Cultivation. In Mr. Clark's pamphlet, he refers to Mr. Hale, who has given him his ideas of intense culture, somewhat broader than the Clark method, on the methods of the State in producing hay, and I shall only refer to Mr. Clark's methods in comparison, leaving that to Mr. Collingwood to specialize upon, as per my agreement with him.

I will first call your attention to the idea of intense cultivation, which is intensifying nature's laws, taking into consideration the artificial results which we, of course, are after.

Consider that a lawn is the result of the most intense culture possible. Secondly, it is the result of the most artificial culture. Let us see if we can't get that lawn into shape to produce the crop that goes into the barn of the buyer. Let us see what

cultivation it must have. First, discriminate in seed. Second, the right system; then the food necessary; and then the production of the crop. The first thing is the germination of the seed. My present topic is one word, "Comfort." The little plant requires, first, these three things, moisture warmth and air. All three are required to germinate the seed, and in proper proportion. Too much moisture won't do. Too much air or too much heat won't grow it. Any two, without the other, won't grow it; any one, without the other two, it will stop. To get nature to act, therefore, remember the comfort of the seed is the first thing in seeding grass land. Second, developing the root system. There are millions of little root hairs or fibres so fine and filmy you can't find them with a spy-glass, and there is not a particle of soil of the meadow at the beginning of the season that has not hundreds of root hairs around it, and if that land is cloddy or full of lumps, or if there is anything to interfere with this multitude of little hairs so that they can't get around, it is threatened with destruction. Then, again, all feeding of plants is by drinking; they must have soluble food, and thus you must have plenty of moisture. It takes 124 pounds of moisture in a plant to produce a pound of hay.

What are some of the enemies of this little plant which affect its comfort? I will name: Poor tilling of the soil, soil in poor condition, or poor bacteria, or not enough. Where we grow two or three crops a season, as in soiling, we must have available and soluble food, and we must have the three elements in foods balanced. Another enemy is rubbish. That includes stones and wood.

The plant demands for its comfort—first, moisture. We all understand the saving of moisture by surface tillage. The second thing is the promotion of bacterial life. When you go into the woods and lift the leaf mould you find the surface of the soil not only full of humus, but intensely alive with what we call bacteria, because those little plants must have air, and if you let the soil grow poor and the rains bottle it up and crust it, you shut out the air, and that is almost as important as cultivating, for the conservation of moisture, so your bacteria must have air and comfort. Now, the grass turf takes care of that condition, if it is properly planted. If you have set your plants thick enough

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and in the right mixture and the right proportion, and if there be no bare spots, which will get hard or be bottled up by the rain, you have a condition for the promotion of bacteria.

We have found that the distribution of nitrogen, which is a life food, takes place little by little, a wise provision of nature. But the bacteria first, one of those agents which change over the nitrogen into nitrates, must be provided for day by day, and that moisture and warmth must go on or nitrification cannot go on.

Also, we must have the right proportion of heat. If half the nitrogen is lost, that is not a balancing. If you double the nitrogen, if you saved it all and then doubled it, you would not have enough for the grass. It still requires more nitrogen. As a rule, you don't give it half enough, and you will find the formulas for grass top-dressing are seldom strong enough in the nitrates.

Lastly, of these troubles against comfort of plants, I will mention rubbish. Don't attempt grass cultivation if there are places where there are quantities of clods or stones. Get rid of them, even at great cost per acre; you will get the money back in two or three years; and don't have any rubbish in the soil, as turf or other things. If you turn your grass over after May to re-seed it in September, you have done an unwise thing in putting the turf down; it should be cut to pieces *first* and then plowed in. You can cut it very quickly, if you cut before your plow, you go deeper and deeper; then plow it, and you have a perfect ash bed there, and the subsoil has not lost its connection by turning the uncut turf under.

Weeds as rubbish. I have walked over Mr. Clarks meadows and have looked and looked in vain to find weeds. It is a perfectly possible thing to eliminate the weed entirely from the meadow, but you can't do it in a week; it takes two months, and then the heat of the summer weather following will take care of the weeds.

I have spoken of bare patches. The bare patch is a loss to you and injures the grass all around, shutting out the air which the bacteria must have. You must have your meadow completely

seeded, and if you don't completely seed it, you may be sure that nature, which abhors a vacuum, will put a weed there.

Need I say you should not pasture them or let any cattle get on a meadow any more than on an onion bed? There should be no pasturing.

If you attend to these things, you will have intense culture.

First, there is thorough preparation. The intense cultivation which precedes the seeding of grass is intended to do the hoeing, the awakening of bacterial life, to get the soil to *hold* the most possible moisture, and perhaps more important than anything else, to clean the foul weeds out. The grass hoe and general harrowing works down ten inches deep and pulls out the perennial weed. Get Clark's little book and it will tell you what to do.

Mr. Clark's plan is worthy of attention. He has taken the Connecticut method, and having behind him a manufacturing plant, with unlimited resources for experiment, with Yankee persistency, he has worked this thing up better than anybody could have done without these aids.

I need not say you should drain your land if it is very wet. That will pay you in one year. You need to pulverize the soil in such a way that there can't be any lumps at all on the surface. You must make this your work until it is done. If you are going to re-seed, you can re-seed in two months; but be very careful of the seed bed, and cut the turf all to pieces before you turn it in. So it may be said we have two systems of grass culture, one before and one after seeding.

Every hollow place and every stone is against the production of grass. First, it is against the seeding of it, because seed washed down into a hollow place grows too thickly; and every drop of water on the surface is deleterious to success. For every size of a big dinner-plate we want 400 spears of grass, and if your surface is not graded you see how you miss that. There is a machine for grading a meadow and twenty minutes will go over an acre.

The fertilizer problem is one we don't agree with Mr. Clark about. I have taken very hurriedly some figures from my own note book to present to you; they are the accumulation of experience, that of others with my own, and I think I am nearer

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the average. We would not use them always upon all sorts of land by any means, so I am very loath to give them, but I will read them for you.

For fertilizing grass I do not depend on barnyard manure, This we use one or two years before seeding, and if we re-seed the same summer it is not well to use the same unless it has been composted several months. I will now speak of fertilizers, because they will show you the three elements required better than any barnyard manures.

For seeding soil that we call fall application, these are the figures for 2,000 pounds:

200 lbs. nitrate of soda,
400 lbs. tankage,
400 lbs. acid phosphate,
600 lbs. bone,
400 lbs. muriate of potash.

We apply from 400 to 800 pounds per acre to the soil at the time of seeding.

Now, for a subsequent top dressing next spring and summer, after each cutting we suggest the following, which is richer in nitrates. This we apply early in April, and again after mowing in July:

600 lbs. nitrate or soda,
600 lbs. tankage,
600 lbs. of acid phosphate,
200 lbs. muriate of potash.

Clark's formula is made up of ground bone, 1,000 lbs.; muriate of potash, 800 lbs.; nitrate of soda, 200 lbs. That is for seeding. His dressing for the spring and summer is: Ground bone, 700 lbs.; muriate of potash and nitrate of soda, each, 700 lbs. That is one-third of each, and his applications are about the amount I have given, viz.: In the fall, 400 lbs. to 800 lbs. per acre, according to the strength of the land, and in the spring 200 lbs. to 300 lbs., and again in July.

When you consider that the seed of a square foot for 400 spears of grass will only have one-sixth of an ounce of this fertilizer, you will see how important it is that it should balance,

and how important it is it should be fully mixed and how carefully it should be put on.

In amount and mixture of seed also, we are not all following Clark's methods, and we get just as big crops, seeding in Timothy alone 16 to 20 quarts; or with Red Top and Timothy, 10 to 15; Red Top, 7 to 10, according to the soil and the other conditions, the length of time we expect to hold the meadow, etc.

When we seed clover alone, which we do, 12 to 20 quarts, mixing three or four kinds.

Now, in the case of seed, I wish to close by saying that the best seed is none too good. You are willing (to insure \$150 worth of potatoes on an acre) to pay \$10 for seed, aren't you? Then why not be willing to pay \$5 for good grass seed?

Learn to use a microscope, and get a piece of white linen that has got checked figures on it, so you can recognize the points on it, and you can see in a sunny day whether there are any foul seed. Get it in a strong light and examine it thoroughly. Then take 50 sample seeds and germinate them; sprout them behind the stove, on the mantel piece, and see not only how they sprout, but what is their strength and their vitality, and if you have less than eighty or ninety per cent. of strong growing seeds, reject it. You will find increasing attention given in all branches of horticulture to-day to testing seed.

Lastly, in marketing hay, learn that you must apply the same courage that a business man does in anything he undertakes. Don't let a liveryman, who thinks he is smart, tell you anything about your business. Make him test the hay with four of his senses before he criticises it at all—see it, feel it, smell it, taste it—and then if he don't know whether woody fibre is there or not, you do, and drive off.

We are learning to produce hay that has very little woody fibre; we are learning to cut it as soon as it *begins* to blossom—and I mean the Timothy, before any of the Red Top blossoms, and then your plants won't die.

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H. W. COLLINGSWOOD.

Mr. President and gentlemen, I have been at Mr. Clark's place a good many times; I have seen him working the ground and harrowing; I have seen him put the seeds into the ground and cut his crop; I have seen him haul the hay to the barn and weigh it. I have not the least doubt in the world that that story he told about his hay is absolutely correct. I have been there and spent several days on his place, and know his method perfectly well; and if there is anyone else in this country, in New Jersey or anywhere else, who has raised more grass or more dried hay on 20 or 10 or 5 acres of land than Mr. Clark, I don't think he has been yet reported; and, therefore, I think we can take Clark's record as the standard. He is one man in a million, I think, when he comes to produce hay.

If we take Clark's method of seeding as the standard we shall find several reasons why the ordinary or average farmer cannot raise as much grass on an acre of land as he does. A Massachusetts farmer told me this story last month, over in Worcester county: He said he had an acre and a half of land that he wanted to put in Clark's grass; so he plowed it up and harrowed it, and tried to "imitate Clark." That land was plowed in the ordinary way; they tipped over the sod so that the grass was down in the bottom of the furrow; then the man was called away to Fitchburg on business, and he told the hired man before he left to take an Acme harrow and harness up and start harrowing, and not to stop harrowing until he came home. Well, he said he came home about half-past four o'clock and he found the hired man sitting under a tree and the horses standing there doing nothing.

"What are you doing there?" he asked the man. The man says: "I have harrowed that field sixteen times and that's enough, and I won't harrow it again for any man."

Now, that man had never before heard of anyone harrowing any grass land more than three times before putting in the seed, and sixteen times was the limit of any man's insane folly with him. Now, that farmer had read that Mr. Clark went over his fields at least twenty times, and he had started out to raise "Clark" grass; so he thought he would shame his hired man and he told him to sit under the tree the rest of the day, and the farmer himself got to work and harrowed the field four times more that afternoon. They seeded it next day, and they have been cutting considerable crops ever since.

Now, that man said: "I put that field in the same as Clark does." But he did not. He did it all in one day; he did his twenty harrowings within the twenty-four hours, while it is a special point with Clark that he keeps the harrowing up for ten weeks, going over it twice or three times every week through the season. Now, you will see what a difference that makes. Those twenty harrowings in a day meant a splendid seed bed, but it only killed such weeds as were sprouted at the time. Clark's plan of harrowing again and again, day after day, at intervals, during the summer, kills crop after crop of weeds as fast as they sprout. I am certain that this long-continued harrowing is one reason why Clark's fields do not run out—why he is able to get from his fields twenty-eight crops, fourteen years in succession, and still have a large crop of clean grass. The foul stuff is all killed out and the grass remains—nothing but good grass. Twenty or twenty-five harrowings extended over ten weeks through the summer—that is the way.

Then, again, in Clark's grass he has a full, square acre of land. I have been all over his field and could not find a stone as large as my hand anywhere on it; they have all been picked up. Mr. Clark and I cut a square foot of grass, an exact square foot of land; we cut it as close as we could, and then sat down under the tree and counted how many spears of grass there were on that square. There were 285 spears of grass growing on that square foot; that is more than two spears to the average inch. Now, my men fitted a field, as they said, "as clean as Clark ever did;" that was the report they gave to me, though I don't always accept such reports, especially if it happens to be a hot day. Well, I found little stones

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scattered all over that field half as large as my fist. In order to be sure about it, I took some measurements; that is, I measured out two square feet here and two square feet there to see how much actual surface was covered by stones, and I picked up the stones that were on those squares and the lumps that lay there after it had been reported clean to me, and I found by actual measurements that at least thirty per cent. of that ground could not sprout a seed of grass. The field was well cleaned; that is, they had worked on it and it was in average condition, and better, and yet over thirty per cent. of the acre was covered by small stones or lumps in such a way that grass could not grow on it. This would not matter with corn or potatoes, for their roots would run down under the stones and feed themselves in that way. As far as trees, especially apple trees, are concerned, my experience is, it is not a bad thing to have a fair quantity of stones on top of the grass or soil; but for little seeds like grass, less than seventy per cent. of the acre was available against one hundred per cent. by Clark's method. I say that to show that where grass grows so much per acre, we find little reasons like that to account for it. When we get six tons of hay on an acre, we don't get it by growing a long, heavy stalk; of course, we get an extra yield by growing the higher grass; but we don't get the heavy crops by height, but by crowding many stalks together so that every square inch has several spires. That is what Clark says—that by crowding his stalks together he gets his big yields.

I have no doubt that some farmers who say they fitted the land as well as Clark did left so many lumps and stones that twenty per cent. of the acre was never seeded. Much the same is true of land that is not graded true; with little holes or hills there will be places as large as your hand, or larger, where no grass can ever grow. It does not take many of such places to knock off 100 pounds of hay from the yield.

Mr. Clark always sows Red Top with Timothy. It increases the yield. It grows in between the Timothy and makes a thick and heavy mat, which would not be there otherwise. Where hay is to be fed on the farm, I would always sow Red Top, as Clark does, because it makes a more nourishing hay than Timothy; but where hay is to be sold, it is a question whether Red Top

will pay. The mixed hay will not bring as much as clean Timothy. I find that Red Top holds out longer than Timothy, especially on acid soils. I have one field where the Timothy has entirely disappeared, while the Red Top cuts over $2\frac{1}{2}$ tons per acre. I think you will find that where there is a quantity of Red Top mixed with Timothy there will be good results.

Now, with me the first cutting of Clark grass has always been a disappointment. It makes a short, thick, close mat, but never gives a satisfactory yield until the second or third crop. I have found this true even on good, rich soil, although it has been better when a heavy dressing of nitrate of soda has been used in the spring. In fact, I doubt if farmers anywhere have anything like the yield Clark tells about without using at least 300 pounds of nitrate of soda per acre in the spring, regardless of any fertilizer you may use in the fall.

Clark's grass must be fed, it seems to me, like a Jersey cow. Put that Jersey cow into a warm place, give her every comfort and stuff her with the most digestible food you can find—that's what you do; you don't let the boy turn her into the haystack on such a night as we had a week ago. Clark, you will find, seeds his grass so that there are twice or three times as many spires to the acre as there would be with an ordinary seeding; then he throws on the fertilizer, and throws it on heavily. I tried it once on a good field. The grass made a thick stand, but we used only 300 pounds of fertilizer to the acre; the grass grew about fifteen inches high, and then stood still, and I don't blame it. It was just like turning five head of cattle into a pasture for food that had only food for three. Good results can't be expected in that way. The farmer who tries this Clark method must remember this, and use more fertilizer than he would by the old method. It is just exactly like putting more cows into your barn and then buying more feed to keep them going.

I am trying a modification of the Clark method in connection with a young apple orchard. We keep the young trees mulched. I have seeded that orchard, as closely as we can get to Clark's method, with Red Top and Timothy and Red Clover, and plan to

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use 800 pounds of high-grade fertilizer per acre each year, six per cent. ammonia, ten per cent. potash, and ten per cent. phosphoric acid. I expect to cut, as we did this year, three-fourths of the grass and make it into hay; the rest, which comes along the rows of trees, we cut and bank around the young trees, pile it right around. The manure fed to that grass helps the hay, the hay is fed to horses, and their manure is hauled back into the orchard again, mulching the trees in a widening circle, widening every year. My experience is that we can grow both grass and apples together in an orchard with success if we use fertilizer enough to feed both crops, and haul back the manure made from the grass and put it around the trees.

I will say here, in passing, that during the past year I have found several orchards in New York State where they are using Alfalfa with great success in apple orchards—ten, fifteen and sixteen years old. They have seeded them about twelve years with Alfalfa, cutting the first two crops of Alfalfa, making it into hay and feeding it to horses, and then hauling the manure back in the spring and putting it around the trees. Now, we have been told by wise men that it is not a desirable thing to put Alfalfa in apple orchards. I think that is true with young apple orchards making growth, but when the trees have made their growth, that is, perhaps trees twelve to fifteen years old, I think it a desirable thing to put Alfalfa there. Anyway, I will say in regard to Mr. Clark's grass, in my judgment, a stockman who can make Alfalfa grow on a farm should put most of his permanent land into Alfalfa and let the grass alone.

Mr. Clark advises the clearing off the last growth in the winter, leaving the soil perfectly bare through the winter; he wants to go in after cutting his second crop and cut off the little crop that grows a few inches high, leaving the soil perfectly bare, because, he says, the field mice nest there and hurt the seeding. My experience is, it is wiser to let that dead stuff die down on the ground; my experience is, we had a better field of grass when we did that; it holds the snow and acts as a mulch and gives a better grass in the spring.

Mr. Clark also objects to the use of stable manure in any form on the grass. It would probably be objectionable to use

coarse manure, but in my opinion a dressing of light, soluble, well-rotted manure, spread on the grass with a manure spreader, is a good thing, and it seems to help the fields.

Now, the chief difference between Clark's method and the ordinary method of plowing and harrowing is this: Clark uses tools that lift up and shake up the soil, while the ordinary turning-plow turns the furrow over and leaves it upside down. In other words, if you use Clark's tools you work like a child plowing in the sand, constant lifting it up loosens it every time. The other plan of the turning plow has the opposite effect; it turns it over and then presses it down. The difference is explained by the different motions of my hand, which you will notice. Here is Clark tossing it up constantly, like that; here is the other plan, pressing it down. There is the difference.

Most of the farmers who seed grass turn the sod or other soil over, so that what is growing on the top is buried completely out of sight; it is turned completely over and now lies eight inches or more down under ground, with its face down. Then, usually with tools working only five inches deep, the farmer turns the upper surface and sows his seed. Clark tosses and chops up the ground again and again, leaving the soil light and open and not packed. The reasons for doing the work in these different ways are very clear. With the plow, the object is to get the grass and the weeds out of sight and to pack the soil on top of them. There are three advantages in this. It takes less time to do what seems to be a clean job; the sod or surface of the ground, turned under, forms a kind of underground sponge to hold water, and the underside of the furrow, turned up like that, contains considerable plant food, which feeds the young grass plants at once and starts growth. The young plants grow better with me with that soil. They don't do as well when the soil is turned over and the seed put into it.

The disadvantages of this plan are apparent. In the first place, you can't obtain the best seed-bed in this way, because most of the work consists in packing the soil down hard. While the first few inches are light and open, the rest below that is packed up by every part of the operation, unless you use a spring-toothed harrow. While the sod or surface soil acts some-

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what like a sponge under the ground, and while that sponge does hold considerable water, there is also a disadvantage in this, for all the grass roots are not likely to go deeper into the soil than that old sod. In other words, you will get a shallower-rooted grass-seed than when the sponge is not there. Those grass roots will stay there, within a few inches of the ground, nine times out of ten, and are more likely to suffer from a drought. That is, in my opinion, the reason Clark's fields endure longer than others, and that is why, in a season like this, when everything was burned up when it should be growing, he still cut a heavy crop of grass. While the grass and weeds are cured by this method, they are not killed. It is only a question of time before they will work up into the new sod and injure the quality of the hay. Most farmers know how rag-weed and similar pests will work into an old meadow prepared for seeding in this way.

Clark's plan, as I have said, is the reverse of this. Instead of hiding the surface by turning it under, he still continues to toss it up with the cutaway harrow. With the same amount of working that is given with the other method of fitting, Mr. Clark's plan would only cultivate the weeds, which would not be a desirable thing to do. It requires, therefore, far more work than the other plan. Instead of having a sod below ground to act as a sponge to hold water, the soil is left uniformly loose as far down as the working extends. This seems to give a deeper-rooted grass that will live longer and stand a drought to better advantage. The sod of weeds and foul grass is broken up and largely destroyed, so that there is much less left to come on later. Where soil is worked twice a week for ten weeks in this way, there is not much chance for rag-weed or crab-grass to work through.

This constant tossing and turning up of the soil turns out the organic matter, and apparently soil handled in this way is in much greater need of fertilizer. It has been my experience that grass seeded in the old way makes a better start and gives a better crop the first year than Clark grass without fertilizer.

The advantages of the Clark method of preparing the soil are that it gives a finer and deeper seed-bed and thus makes

possible a better seeding, and it gives a deeper-rooted and more enduring plant and kills out far more foul grass and weeds than the other plan will. The disadvantages are that it requires four times as much work and time, and necessitates the use of more fertilizer.

Now, I think no man who has ever tried this method faithfully will deny that he secured more grass and a more enduring meadow than he did by the old plan.

Will it pay? Is the gain large enough to balance the loss? And how far will it pay the average farmer to imitate Clark? That is the point. How far will it pay to imitate Clark in everything he does?

Now, up where I live, in Bergen county, there are very few average farmers who could possibly carry out his plan in full. They could not if they tried. Why? In the first place, they have only two or three horses on the farm, and the time when lonk working ought to be done, that is just the time our market crops have to be hauled to market, and teams and men are working hard. How is a man to work a piece of ground twenty-five times under those conditions? His potatoes and melons and other crops have to be hauled to market at night, and the man spends his day time getting his load ready. It would not be possible to take care of the other crops and fit a field of any size on the Clark plan. Yet I know by experience that a man can take a small field at a time and partly carry on this plan with success.

Again, on our cultivated land our rotation is short, and I do not believe the full Clark plan will pay in a rotation, where grass is cut only two or three years. That is my experience, after trying it. Where a man is running a short rotation, with potatoes and other crops coming along every four or five years, I don't think it will be possible to carry out Clark's plan in full.

Many farmers seed after potatoes, fitting the soil as soon as the tubers are dug. They usually sow wheat with the grass. In many cases, I think they would do better if they would leave the wheat entirely out, fit the soil better and sow grass alone.

There can be no doubt that continual culture through the summer makes an ideal seed-bed for grass. I doubt if anybody in

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this country has produced anything equal to Clark's grass. I recall, however, the fact that I know of a farmer in New Jersey, not far from here, who on an acre of ground made as much grass as Clark ever did. But how did he do it? He grew on a small field as much as Clark ever did, but that grass was seeded alone after onions. Those onions were hoed and cultivated quite as many times as Clark does his grass, if not more, and of course they were heavily fertilized, and then when the onions were out he went in and worked it several times more, and then he sowed his grass; and I am quite certain he cut as much grass there as Clark ever did.

Whether this tossing of the ground is done while a crop is growing, or when it is out, it is a good thing for the grass crop. If farmers in parts of this State would take Clark's tools and sow grass without any wheat, I think in the end they would be better off for doing it, cutting the grass three times instead of twice.

While Clark has shown us all that more thorough culture means more grass, I think there is a limit to his full plan. If I were putting down a permanent meadow, I would follow it as closely as I could, except that in addition to the Red Top I would put in a few pounds of special grasses; Alsike clover, I think, would be good, especially if hay was to be consumed on the farm. I would take a few acres and give them thorough culture many times rather than try too much at one time.

I have an old "Greenings" orchard, which I found on my farm; there are 25 trees, a full acre would have 36. I cut off the lower limbs of those trees, and then went in there and tried Clark's plan as carefully as we knew how. We put it in, and we fed it. This year, the third from seeding, off that orchard of twenty-five trees—after hauling out \$75 worth of grass from that small piece of land—I had apples that sold for \$120; but I had to feed both grass and apples. It would have been better to have seeded that grass down, taken care of the grass and let the trees take care of themselves.

As I say, I don't believe the average man can ever put all the time Clark puts into the preparation of certain particular grass lands. With the present high price for hay, I think it will pay

many of us to put down much of our natural grass lands into permanent meadows and abandon our rotation on the farm, and fit and care for them so that they will not need plowing for six or eight years. In my part of this State I know it is going to pay us to put the natural low land into permanent meadow and let it alone, feed it well year after year, selling the hay, and confine our rotation to the other parts of the farm that are not naturally grass land. In fact, the Clark plan is for permanent meadows rather than for a rotation, especially near a local market where a good price can be obtained for hay.

On a stock farm, when Alfalfa can be made to grow it is doubtful if Timothy can be made to pay to grow for feeding. But I know some dairymen in New England who are getting their land into Alfalfa and Clover, as I advised a while ago; they are drying out the soil and seeding it down as well as they can on the Clark plan. They sell all the Timothy hay and use the money to buy grain to feed with the Alfalfa and the corn. I know several places in New England where that scheme is being worked; they put the natural grass land into Timothy, a quality of hay that will sell and bring cash; they sell that hay and buy a class of feed that goes best with Alfalfa and corn in the silo.

So I think there are possibilities of using and working Clark's plan, although I would not advise a man to start in this year and say he is going to put in ten or fifteen acres on Clark's plan unless he is willing to put up the money and the time, and lay aside his team and his hired man, and seek to do and carry out what Clark says; for, as I said before, if you are only going to put the same amount of labor into the Clark plan as in the old plan of turning the sod, you won't do it as well. You have to consider that, and whether it is going to be worth more money to get this extra yield of grass and cut your meadow year after year for five or six years, or turn it every two or three years.

The Chairman—The subject is now open for discussion, are there any remarks?

Mr. Hoard—Let me ask Mr. Collingwood one question. Do you mean you fit the ground and sow it to grass after the crop is taken off?

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Mr. Collingwood—Yes. We disc-harrow the ground and sow the crop much earlier.

Mr. Hoard—You are not talking about the double crop, wheat and grass?

Mr. Collingwood—Not at all, simply the grass. We fit the ground between the first of August and the middle of September, when the potatoes are dug—sometimes as late as the tenth.

Mr. Hoard—I don't understand; the statement is made that Mr. Clark cultivates ten weeks. Then does he cultivate after the grass is in?

Mr. Collingwood—I was explaining his plan of renovating an old meadow. His plan for re-seeding grass in entirely for an old meadow. I don't mean he went to his corn field and worked ten weeks with a cutaway harrow.

Mr. Roberts—I think one of the greatest improvements I have ever made in farming has been right on this line. I was taught, after we had taken off a crop of potatoes, to fit it either for grain or grass; we would, for the last, put on a coat of manure, possibly, and sow to grass. In later years we have got by all that. I don't care how foul the ground gets after the potatoes, I don't care for it to get foul at all, but sometimes it does get grassy, but we don't plow any more in the autumn. I would almost sue a man if he did. By putting on the harrow and chewing that up, we are raising better wheat and better grass, far better than we were, and we don't have a tenth part of the weeds. Take a field and plant potatoes in the spring, and you keep most of the weeds that are there under the surface, and by constant stirring early in the spring those weeds are killed. The summer grass that comes up don't amount to anything; you can kill it in the autumn. If you do turn up some weed seed, work them up with your harrows and kill the weeds out. If the grass is two feet high, we work it under with the harrow. Where we put down a field of grass that way, we frequently mow one to seven, and even eight years, and we get good crops every year right along, and I never could do it until I got to sowing it in this way. We have got rid even of the plantains,

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the worst weed for a grass field that ever grows; they have nearly left me.

Mr. Hoard—When would you sow this—in August?

Mr. Roberts—Just as soon as you are ready; Alfalfa earlier than August.

Sweet Potato Production in New Jersey.

Sweet Potato Production in New Jersey.

Producing the Plants.

NOTE.—The material contained in this article was obtained during 1903 by the Secretary of the New Jersey State Board of Agriculture, with the approval of the Executive Committee, for the benefit of those farmers who are interested in the production of sweet potatoes in New Jersey.

Methods of production have changed in several particulars within the past few years, and it is believed the information herewith published will be of much value, as it is furnished by well-known producers who have made a success of the business.

Col. A. W. Pearson gives the methods pursued at Vineland on a very light sandy loam; Walter Heritage those followed at Swedesboro on a red sandy or sandy loam soil; H. O. Newcomb the prevailing methods at Cedarville on a light sandy soil.

Dr. Byron D. Halsted treats at length the diseases affecting this product.

The annual output of this crop is increasing. It now exceeds over 1,500,000 bushels, and, if this publication will aid in still further increasing the quantity, quality and value of this crop in New Jersey, the purpose in its preparation and publication will have been accomplished.

Nearly all of the questions were answered by all three of the correspondents named, and their replies are given to each question in the order indicated: Col. Pearson first, Mr. Heritage second, and Mr. Newcomb third, throughout the entire list of questions. This article has been printed in pamphlet form, and persons desiring a copy will please address Franklin Dye, Secretary, Trenton, N. J.

1. Describe construction of hot-beds and methods of producing heat in same. Give dimensions.

Pearson—Hot-beds are made of size sufficient to produce the number of plants required: about 7,500 per acre.

I have a hot-bed six feet wide and sixteen feet long, which to this date, July 1st, 1903, has given at the *first* pulling ten thousand plants, and which may yield as many more at the second pulling. The sweet potatoes laid in hot-bed will continue sprouting, as sprouts are pulled from the tuber.

Mr. A. P. Arnold, of Vineland, who, this year, has twenty acres in sweets, has two hot-beds, each twelve feet wide and fifty feet long, heated by furnace heat.

To make these beds, the earth is excavated about three feet deep, twelve by fifty feet superficially; across this are laid joists strong enough to sustain the superincumbent weight. On these joists is laid a flooring of plank or slabs, over which is scattered hay or straw to keep the soil spread on this flooring from leaking down through its cracks. On this floor is spread about four inches in depth of the soil on which the potatoes are laid side by side and covered by two inches of soil, on which is spread a thin layer of hay to protect from external cold.

The furnace, three feet high and four feet long, of brick, arched or covered with metal, is at one end of the hot-bed. From this furnace, flues, tile or metallic, are laid to the further extremity of the bed. The products of combustion there escape and diffuse in the open space beneath the bed, and are finally vented through the two chimneys at front end of the bed at its corners near the furnace. Heat in furnace is generated by combustion of dry wood.

These flues, to radiate heat and to vent the smoke, are covered with earth for about ten feet from their exit from the furnace, then left exposed in the vacant space beneath the bed, that the heat from them may have free access above. Many farmers heat their hot-beds with manure from stable. This method is familiar and needs no description.

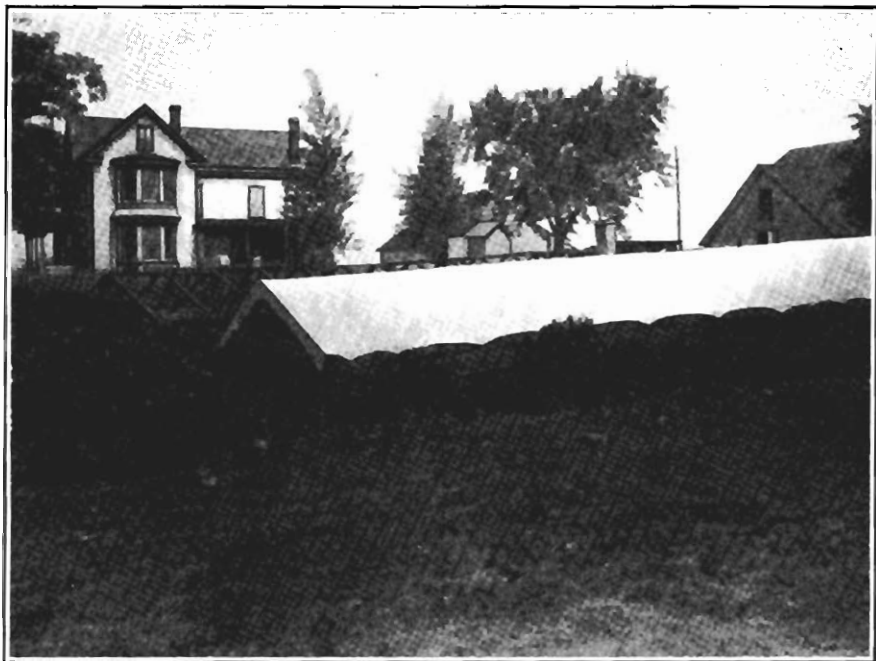
Heritage—The preparation of the hot-bed and the growing of the plants are of the first importance, for, if we fail to grow good hardy plants, the chances are against producing a full crop of fine potatoes.

The present method of producing heat is by fire rather than by manure as formerly.

Dimensions of hot-beds shown in picture (Plate I.): Length of front bed, 60 feet; width, 12 feet. Length of rear bed, 50 feet; width, 12 feet.

The beds are made with tile flues, two rows, one on each side running about two-thirds the length of bed. Furnace is made of brick and low enough to give plenty draught.

PLATE I.



This picture contains two hot-beds, one bed with canvas and one without.
These beds are heated by fire. See dimensions in first question.

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Newcomb—In constructing sweet potato hot-beds in this section of New Jersey, the furnace is built about six feet from one end of the frame or bed, which should be at least three feet deep and two feet wide. Start the flue from the top of the furnace and grade to run to the surface at the further end of the bed, which is sixty-four feet long and ten feet wide. The bottom of the bed should be curved out to a depth of one foot to give space for the flue and hot air, conforming to the grade of the flue the entire length.

Over this space and the flue, cross sleepers are placed every five feet and covered with boards for a floor of the bed. The sides of bed are one-foot boards, and should rest on the ends of the sleepers, which form a box or bed for the plants. At the further end of the flue a smoke-stack is constructed out of one-foot boards eight feet high and one foot square. Heat is produced from wood, coal, etc. Some growers use glass sash, others cloth covers, others salt hay; the latter is mostly used.

2. *Time—date of preparing and placing soil in bed.*

P.—Time of preparing and placing soil in the bed should be in late March or early in April. My manure-heated bed was made March 24th.

H.—The time of laying the seed in bed varies in different localities. If the weather is favorable, the 20th of March to the 1st of April is a good time. If one has early land, even earlier than the 20th will do if a good cover is used to keep the snow and cold rain out.

N.—The time of putting soil in bed is April 1st, but this must be governed by conditions of the weather.

3. *Character and thickness of soil.*

P.—Soil should be of very light sandy loam, four inches deep beneath the seed potatoes, two inches covering them, and should be fairly fertile and kept moist.

H.—The selection of soil is a very important part. It should be clear of stones and light or sandy. First, place on the bed a thin coat of long manure or straw to keep dirt from leaking

through, then put a layer of soil, beginning at the furnace with not less than three or four inches, and grade it down to three inches at the chimney end of bed.

In making a hot-bed every farmer has, probably, a little different way in thickness of soil and amount of manure, though the general principle is the same.

N.—The soil for the bed should be light sandy loam, or preferably sand to any clay mixture, and should be at least four inches deep over the floor of the bed.

4. *Time required for heating bed before seed is placed therein.*

P.—Time required for heating bed before seed is placed therein seems not material: for manure bed three or four days. With furnace heat the tubers may be placed in bed soon as it is made.

H.—That depends altogether on the weather. If conditions are favorable, we have frequently made the bed complete before starting a fire, and had excellent success. If bed is too warm when seed is placed therein, the seed is more likely to rot.

N.—About one day.

5. *Temperature of soil when seed is put in.*

P.—It should be 60° to 70° Fahrenheit.

H.—Temperature should not be over 65° when seed is placed in bed. A few years ago some farmers put the potatoes in the bed promiscuously, leaving them there a few days, after which they were taken up and relaid. They claimed this would prevent rotting of the potatoes: we doubt the wisdom of this plan. We very seldom build a fire until bed is made complete, and we have never lost the seed by being too cold.

N.—Temperature about 70°.

6. *Average subsequent temperature until plants are grown.*

P.—Temperature should be 75° to 85° Fahrenheit.

H.—This question, while it is a very important one, is somewhat difficult to answer. I think, however, if the temperature is

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kept at 75° or 80° better plants would be produced than if the temperature is higher.

N.—The temperature of the bed should average as near 65° to 75° as possible during the growth of the plants.

7. *Depth of seed in bed.*

P.—About two inches.

H.—The number of seed required to lay in a bed depends on size of seed. Small potatoes will cover more square feet than if seed is large; we prefer the medium-sized.

N.—The seed should be laid in the bed and covered about two inches deep, and an average temperature maintained until well grown.

8. *Average time needed for plants to become large enough for transplanting.*

P.—From four to six weeks. They will be sooner ready in furnace-heated than in manure-heated bed.

H.—About six or seven weeks would be the average time needed. We have grown plants large enough in four weeks when conditions were favorable.

N.—Plants large enough to transplant to the field will require from five to six weeks, during which time they should have close attention—protection or ventilation as the conditions demand.

9. *How many plants fit for main crop setting ought one bushel of seed produce?*

P.—One bushel of seed ought to give plants for setting, say one thousand; but this depends much on size of tubers in the bushel.

H.—The number of plants pulled from a bushel of seed depends altogether on the success we have in the bed. The two beds shown in Plate I. pulled 100,000 first pulling. These beds contained: First bed, 48 baskets; second bed, 35 baskets.

N.—Three to four thousand plants.

10. *Method of hardening plants before removal from hot-bed.*

P.—The method of hardening is to remove the covering from bed on mild days, thus exposing plants to light and air.

H.—To grow good hardy plants one should commence almost at the time when plants first appear in the bed. Do not leave hay on too long after that. If this is neglected and sprouts are allowed to run up into the hay four or five inches, they will never make good plants, and, as soon as they are exposed to the air, they will blacken, and it takes a long time before they will start. This is the most critical time with a hot-bed; watch it closely, and as soon as they begin to break through the ground, remove the hay, and if it is a good day can leave it uncovered by sprinkling a little hay on bed to protect the tender plant from the cold air, if any are up. At night the hay should be placed on bed again. After the plants are thoroughly up, placing hay on sprouts can be dispensed with, using canvas instead. Do not let the bed get too dry, as this will often times stunt the plant.

N.—Remove all covering. Keep them off at night when not too cool.

11. *Describe method of separating plants from the tubers in hot-bed prior to setting in the field.*

P.—They are pulled from the tuber as it lies in the bed, using fingers of one hand to hold tuber in place while plant is detached from it.

H.—Plate II. shows a hot-bed of plants ready to be set in field. The method of pulling plants varies. Some farmers, if they have plenty of good plants, pull everything as they go and sort the good ones out, while others will pull the good sprouts only, leaving the poorer ones to mature, if needed.

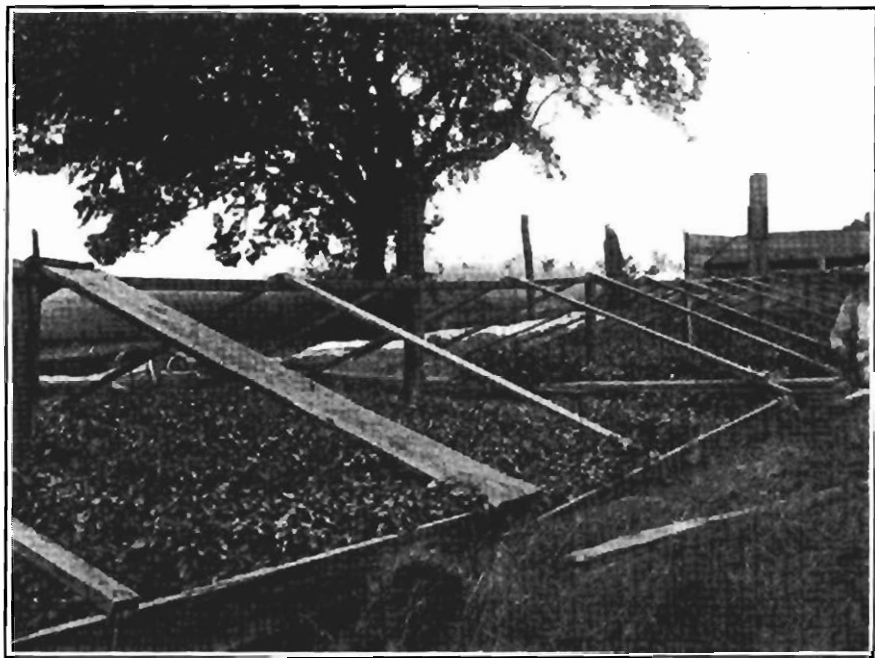
N.—By placing left hand over the tuber and pulling the plant with the right.

PRODUCING THE CROP.

1. *Kind and character of soil best suited for sweet potato production.*

P.—A very light, sandy loam.

PLATE II.



A bed of sweet potato plants ready to be set out in field.

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H.—A red sandy soil is best suited to grow gilt-edge potatoes. The poorer sandy soils produce good crops where they are properly fertilized.

N.—Light sandy soils.

2. *Do different soils affect the edibility and market value of the crop? If so, in what particulars?*

P.—If grown on dark heavy soil, the tubers may be externally discolored, and are not so well flavored.

H.—Potatoes grown on a light soil are much better, as they are mealy and dry, while those from a heavy soil are oftentimes soggy, especially after they have been stored away for winter use. It is very important for anyone storing sweet potatoes for winter to select them from such soil as mentioned above, and gather them early.

N.—They do. Heavy soils produce a heavy, soggy, dark-colored potato, which is neither desirable nor salable, while those grown on light soils are dry and mealy, brighter color and command higher prices in the market.

3. *Has the sub-soil any influence upon crop production? What should be its character?*

P.—It should be light, porous and well drained.

H.—This depends altogether on the season. If we have a dry season, a sub-soil somewhat heavy will produce a good crop, better probably than a soil that is very sandy, but a light loam with a red sub-soil will produce, as a rule, if potatoes start right, a good crop every year, and will demand the highest market price, as they contain all the good qualities.

N.—Yes. Sub-soil should be hard, as it induces a shorter potato, which adds to its value in the market and induces readier sale.

4. *Describe method of preparing soil for planting.*

P.—Plough four or five inches deep and pulverize with harrow.

H.—The preparation of the soil is very important. Plowing should commence as early in the spring as possible, and not too

deep. When the proper time comes, a thorough cultivation is needful before marking out for the fertilizer or manure.

N.—Very shallow plowing, after which ground should be well pulverized and marked out two feet nine inches each way.

5. *Method of manuring. Compost of stable manure or commercial fertilizers. In hill or broadcast? Give amount per acre and kind of fertilizers. Ever plough under green crop or stable manure for sweets? Is it a good or bad practice, in your opinion?*

P.—Straight parallel furrows three feet apart and three inches deep are opened, along which the manure or fertilizer is sown and covered by ridging with the plow, or by a ridger made for this use. No manure broadcast. In the furrows about two tons per acre of well-rotted stable manure compost or a half ton of commercial fertilizer suffice, if the fertilizer be rich in potash. In my own experimenting with sundry fertilizers, I had largest yield of potatoes from *Canada ashes*, which being from wood grown on a potash soil, contain much potash. In southern New Jersey, it is not the practice to plow under green crops or stable manure for sweets. To prepare land for production of a crop it is well to plow under, years previous to culture of a crop of sweet potatoes, a sod to give the soil a supply of organic matter. Thus, it is well to practice rotation of crops.

H.—According to my experience and observation, the growing of sweet potatoes in Gloucester county has become revolutionized in the past two years. Nearly all growers in the vicinity of Mullica Hill and Swedesboro are broadcasting manure and using fertilizer in the row, or raising them with fertilizer alone. Potatoes grown with no manure in the hill are smoother and brighter and command a better price than where manure is used alone, and we are satisfied that we have less ground disease by using fertilizer than where manure is used in the hill. For soil that has a ground disease, a broadcast in the fall or winter of five hundred or six hundred pounds of Kainit to the acre; then in the spring use fertilizer and keep manure out of the hill; lessens this disease to a great extent. Where there is no ground disease, there is enough potash in an application of 700 lbs. per acre of a sweet potato fertilizer running from ten to twelve per

PLATE III.



The above picture shows the operator at work setting out plants with the hand planter.

PLATE IV.



This picture shows the mode of setting out plants and watering.

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cent. of actual potash for a crop of sweet potatoes. Most growers use one hundred pounds of good fertilizer to one thousand hills; some use more where manure is not used. Many beginners make a mistake by putting it too much in the hill, and not scattering enough. It is also too often used too near setting-out time. It is much better to have the fertilizer in the ground three or four weeks before setting-out time than three or four days. This gives the rains a chance to dissolve the potash. If fertilizer is put on by hand, do not drop in the hill, but give it a swinging, scattering motion, so it will almost meet between the hills. Many use a Spangler drill, which has a tooth following behind to mix the fertilizer. Cover with dirt very lightly, so as to give the rains a chance to dissolve before the ridge is made. More plants are lost from a too-late application of fertilizer than any other cause. This cannot be too forcibly impressed upon the minds of growers.

N.—The plowing under of a green crop or stable manure is all right for this section. The sowing of some green crop in the fall should be done more than it is. The crop should, however, be sown so early in the fall that it will make a good growth before winter sets in; then it will be ready early in the spring for the plow. Stable manure broadcast in the fall previous; about six to eight tons per acre. In the spring, after marking out, apply in the drills or hills six hundred pounds high-grade fertilizer, before ridging up or making the hills. Green crops plowed under in connection with manure, we believe, is a great benefit to the crop.

6. Plant in rows or hills? Set by machinery or by hand? Level or hilled up—which is better?

P.—Here the custom is to plant sweets in rows ridged three feet apart, the sets or plants eighteen inches apart on the ridges. Mr. Arnold uses a machine known as *The Bemis Planter*, drawn by two horses. It will plant two and one-half acres a day. There is also a hand planter sold at all hardware stores which is popular. See Plates III and IV.

H.—The plants are set in hills, as a rule; sometimes set in drills two and one-half feet by eighteen to twenty inches, but the majority of truckers put them in hills about two and one-half

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feet each way. At this distance they are easily cultivated and kept well hilled up, which is very important in the growing of an early crop. The plants are set out by a machine. An expert hand can put out fifteen to twenty-two thousand a day, and I have heard of some reaching twenty-five thousand. The machine is in two parts, tongs and puncher; the cost, about one dollar and twenty-five cents.

N.—Both methods are practiced. When in hills, about two feet nine inches each way; when in drills, about two feet nine inches by two feet. In setting, trowels or tongs are used, as best suits the planter.

7. *Are plants puddled before setting or wet after setting?*

P.—Plants are not usually puddled before setting nor wet afterwards, though it might be well to puddle the roots if soil be dry. To wet plants after setting is useless or unprofitable.

H.—It is a good practice to puddle before setting out, and, as a rule, we water after setting, as it settles the dust around the roots, and, if it is very dry, plants will start better. We sometimes water when the ground is really too wet to set out, so that the soil will settle around the roots.

N.—Both methods are employed, but we believe watering, after plants are set, pays well for the extra labor required.

8. *Number and depth of cultivations. Methods and implements.*

P.—Cultivation should be continuous as possible until the vines are well started in growth. Weeds are best killed so soon as their seeds germinate.

H.—The cultivation should commence as soon as plants get thoroughly rooted, then run the cultivator both ways each week, if possible, until through with them. If it should be very dry, the importance of thorough cultivation is very essential; it not only creates moisture, but keeps down the foul weeds. Depth of cultivation varies. We use the Bateman Harrow, with vine turner attachment. After vines begin to start, put half hoes on each side of harrow, and a seven or nine-inch hoe on back. The

PLATE V.



Matured Crop.

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sweets being in hills and farming both ways, compels us to go deeper than if we only cultivated one way.

N.—We use a Planet, Jr., or an Iron Age Cultivator, from three to five times, as conditions demand, at a depth of two to four inches, always hoeing or hilling plants at each cultivation, which is required two or three times during the season, as conditions may require.

9. *Allow vines to fasten to ground or keep loosened? Effect of either upon the crop?*

P.—Whether the vines take root as they grow, or are kept loosened, seems of no consequence as to any injurious effect on yield of crop.

H.—It would be almost an endless task to keep the vines free from the ground, especially in a wet season. We believe, however, it is important in running through the last time not to throw the dirt too much on center of hill.

N.—We never allow vines to root and fasten to the ground, as it retards the development of the tubers.

10. *Maximum period for producing crop. Give methods of producing extra early crop. Do such crops, as a rule, pay better than the general crop?*

P.—Six months from the time that the tubers are planted in the hot-bed. There seems no feasible method of producing or obtaining extra early crop. Effort to obtain this is unprofitable.

H.—To produce a crop of potatoes early, you must select a warm sandy soil, not too poor, used for melons the previous year is a pretty good place. If fertilizer is used, be sure and get it on early so that it will be thoroughly incorporated with the soil. The next important thing is to have good hardy plants, all ready for the first warm spell; that occurs frequently here the last of April or first of May. A crop of early potatoes always pays. And there are many advantages over a crop that is put away for the winter trade. After the early ones are dug; the ground can be sown to rye or crimson clover, and this will make a nice sod to plow under the following spring. I think, as a rule, the early crop pays best and saves some labor.

N.—About four months from time of setting in the field to mature ready for market. We do not try to produce early crops, as the South has the advantage of climatic conditions, and we can get better margins by letting the crop fully mature.

11. *Time of digging most common. Methods; implements.*

P.—The usual time of digging is during October, when the rows of potatoes are plowed out with sweet potato plow.

H.—The time of digging most common here commences about the 25th of September. There are several makes of diggers, nearly all on the same principle. We use the Allen Digger, and think it superior to all others. It is well made, and raises the potatoes out good, if the ground is not too wet.

N.—Commence to dig crop about the middle of September generally. The Planet, Jr., Digger is used to take them out, but some use the plow.

12. *Effects of frost upon the undug crop.*

P.—A light frost to merely kill the vines is not injurious to the tubers.

H.—A light frost will do no harm. Even if it blackens the vines, it will not injure the potatoes; but a frost that will freeze the ground will be liable to split the ends of potatoes and cause them to rot.

N.—It is desirable to have the crop dug before frost kills the vines, as it is apt to injure both the keeping quality and the flavor of the tubers.

13. *Method of marketing from field. Baskets, boxes or barrels?*

P.—Sweet potatoes in this region are seldom marketed from the field. If they are, it is chiefly in half-bushel baskets.

H.—All potatoes are placed in five-eighth baskets in the field, and if carted to Philadelphia markets are sold in baskets. If hauled to the station, they are sold by the barrel.

N.—Marketed from the field in barrels and half-barrel baskets, mostly the latter. In home markets, five-eighth-bushel baskets.

PLATE VI.



Harvesting the crop.

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14. *General average yield per acre.*

P.—The general average yield per acre is about eighty bushels of primes, twenty bushels of second size, and a few bushels fit for pig food.

H.—I would think the general average yield per acre would be about three hundred five-eighth-bushel baskets. Know of some, however, that doubled this amount last season.

N.—From thirty-five to forty barrels, and frequently sixty to seventy-five barrels per acre.

15. *What is considered a profitable yield; i. e., number bushels or barrels per acre, and at what price? What is the usual price, Fall—Spring?*

P.—This average yield—eighty bushels of primes—per acre is regarded as profitable at the usual price, which has been about one dollar and fifty cents per barrel in the autumn, and two dollars and fifty cents to three dollars per barrel in the spring. The barrel is counted as holding three bushels.

H.—We consider three hundred baskets a profitable yield, counting three-fourths of them large potatoes at two dollars per barrel—small at seventy-five cents per barrel, being a little over one hundred dollars per acre. There are a number of farmers who do better than this. The usual price in the fall depends altogether on the demand and the quality of the potatoes. They usually sell well until we have a killing frost accompanied with a heavy storm. We think one dollar and fifty cents to two dollars and fifty cents is about the average price, taking one year with another. Potatoes kept until spring sometimes bring a good price, as high as four dollars per barrel. It depends on the weather. If we have a backward, cold spring, they often sell well, but if conditions are opposite, they often drag on the market, and are hard to sell at any price. Cut VII. shows a crop grown by W. H. Longacre, between Mullica Hill and Swedesboro. Seven baskets to one hundred hills. No stable manure used.

N.—Forty barrels per acre at a price of one dollar and seventy-five cents to two dollars clear of expenses for fall prices. In the spring we expect them to clear from three to four dollars per barrel.

16. *Method of storing for winter preservation.*

P.—The method of storing sweet potatoes for preservation through the winter, generally, is in well-ventilated cellars warmed by fire in stoves.

H.—Most of the potatoes are stored in bins, fifty to one hundred barrels in a bin, in building or cellar. Plenty of air should be allowed to circulate and the heat maintained at sixty-five to seventy-five degrees until the potatoes pass through the sweating process. Then close windows and reduce heat to fifty to sixty degrees. There are a few farmers that put the potatoes in bushel baskets or boxes, and store them until they are ready to sell, when they are shipped in box without disturbing them. This is all right if one has plenty of room.

N.—Store in a dry cemented cellar, having previously started a fire about two days before potatoes are stored.

17. *Proper temperature; how maintained?*

P.—The proper temperature is from seventy-five to eighty-five degrees when the potatoes are first stored, and this maintained until moisture is dried from their exterior, or, as is often said, "until they are done sweating." After this the temperature may drop to fifty or fifty-five degrees. The essentials to preservation appear to be dryness and freedom from disease.

H.—This is a very important question. Give the potatoes plenty of air and heat, while storing them, and keep this up until they get through sweating, after which close the windows, if weather is cold, and slack up a little on fire. Do not keep them too warm, as they will sprout too much. We never use a thermometer, but watch the potatoes.

N.—Temperature about ninety degrees, and maintain this temperature in the cellar until the potatoes are thoroughly dried out, after which let the temperature fall to about sixty-five degrees.

18. *Cost of production per acre?*

P.—The cost of production per acre is so indefinite and is dependent on so many contingencies that it may not be accurately stated. By many farmers it is roughly estimated at about twenty-five dollars per acre.

PLATE VII.



Grown by W. H. Longacre, between Mullica Hill and Swedesboro. Seven baskets to 100 hills. No manure used. High-grade fertilizer, 700 lbs. to the acre.

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H.—From twelve to fifteen dollars, including fertilizer, preparation of the soil, tilling, etc.

N.—Cost of production per acre, forty to forty-five dollars.

19. *Average money value realized per acre for a period of five years?*

P.—The average cash value per acre for a period of five years is a problem in finance, the solution of which may be merely guessed at. General consensus of opinion stated it at "about eighty dollars."

H.—Counting a cent per hill would be about sixty-five dollars per acre. Some may think this too high, while others would claim it low. There are a few farmers, taking a period of five years, would clear one hundred dollars per acre, but, taking all, we think sixty-five dollars plenty high.

N.—About seventy-five dollars.

PROMISCUOUS.

1. *Ever plant tubers in field for crop production?*

P.—The sweet potato tubers are not planted in the field for crop production.

H.—Never have.

2. *Ever produce sweet potato bloom and seed?*

P.—Have never produced sweet potato blossom or seed from the plant. Those who have seen a sweet potato blossom say it resembles the common "morning glory."

H.—Some have found bloom, but nothing developed from them.

3. *What insect enemies, if any? Treatment of same.*

P.—There are no insect enemies incident to the sweet potato in this section, except cutworms, and harm from these is not serious. The worm eats the plant at surface of ground. If the plant be deeply set it will sprout from buds below after worm is gone.

H.—The black flea, striped bug and pedler are three insects that cause trouble here. The flea usually attacks the plant as soon as set out. They are more numerous where potatoes are set out after potatoes; that is, where potatoes had been the previous year. The best remedy is to spray the plants, before pulling from hot-bed, with paris green, bluestone and lime, the same formula that is used for tomatoes. The striped bug and pedler are the worst insects we have. Have seen fields of potatoes almost ruined by the pedler, which comes from eggs deposited on the plant by the striped bug. Insects usually attack potatoes the worst on heavy soil. Some farmers are never troubled with bugs of any kind. Paris green and plaster, one-half pound to bushel, sifted on plants after they get well rooted, will destroy the eggs, and there will be no more trouble.

4. *What diseases, if any, affect the sweet potato? Character and extent of the injury.*

P.—The disease affecting the sweet potato plant and tuber are caused by microscopic vegetation, known to botanists as fungi, parasitic upon higher organisms. They may be, to a great degree, prevented, but are not readily cured. By subjecting the plant and its product to healthful conditions of growth and storage they may be enabled to repel the invasion of these destroyers, or such conditions may weaken vitality of the fungous spores, thus paralyzing their activity. Warmth and moisture seem conducive to these fungied growths; deprived of these they fail to flourish. If the sweet potato in storage be kept dry, its various rots cannot take root in it.

H.—Black-rot, stem-rot and ground disease. This disease first makes its appearance in the hot-bed, and we have seen plants in an entire bed affected so they were not fit to set in field. The potatoes are marked so badly sometimes that they are not salable. Stem-rot is a very bad disease. Plants affected with it commence to go pretty soon after they are set in field, and continue dropping out until digging time. It affects the heart or stem of the plant, beginning to go at bottom, working upwards. The black-rot shows more in a dry season, and we have seen fields of potatoes

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affected so badly that the crop was worthless. But by the use of Kainit and fertilizer the disease is checked at least fifty per cent.

5. *Any blight of vines? Cause and effect. Treatment.*

P.—The sweet potato vines are not harmed by any blight here.

H.—We know of none.

LATER OBSERVATIONS MADE SUBSEQUENT TO SEPTEMBER 22D,
1903, BY COL. A. W. PEARSON.

With regard to the various fungous growths parasitic upon the sweet potato, the most damaging is the *stem-rot*, and this has this summer been to me a puzzling study.

On the farm owned by the writer, on a piece of land which in 1902 was cultivated in corn, about ten thousand plants were set from the "first pulling" of the small hot-bed, described on first page of this report; the plants were vigorous and seemingly healthy. When they began to grow vines, they began dying with *stem-rot*, and this continued until fully three-fourths of these plants thus perished, these being replaced by plants drawn from the first, second and third pulling of the same hot-bed above described.

Later on about two thousand plants of fourth pulling from same hot-bed were set on another piece of land, which the previous year had been cultured in sundry vegetables for home use. Among these last set plants I find *none affected* with the *stem-rot*. They are growing in apparent health, and setting seemingly healthy tubers.

On recent inspection of the hot-bed whence all these "pullings" of plants were taken, I find that fully one-half (or maybe more) of the tubers in it are rotten and lifeless, while the remaining tubers in this bed are sprouting as usual. I suspect that the rotted tubers are those infected with *stem-rot*, and that this explains why those plants which were set from the fourth pulling remain healthy, they being taken from the uninfected tubers resting in the bed after those diseased with the *stem-rot* had ceased sprouting.

A neighbor tells me that if the seed tubers, before being placed in plant bed, are inspected by breaking off the seed end of the tuber, its internal tissue may be seen discolored by what he suspects is the primary symptom of the fungus of the stem-rot. I learned of this too late this season to make such microscopic inspection as might have verified this neighbor's statement.

Of the several kinds of sweet potato grown in this region—Southern New Jersey—the *Yellow Nansemond* seems the most subject to the stem-rot. This may be because hitherto it has been the most widely grown.

I have inspected other sorts known as the "*Big Stem*," and the "*Bush Top*" (see Plate VIII) sweet potatoes, which are said to be less subject to stem-rot than is the *Nansemond*, but I find the stem-rot more or less in all.

Mr. Arnold adopts the plan of growing what he calls "slip sets" to produce the tubers from which to grow plants in hot-bed the next year.

The sweet potato vines, when grown from tuber in hot-bed or elsewhere, are cut into cuttings or slips, say ten or twelve inches long; these are set in rows or hills like the rooted plants are usually planted. These slips take root and often produce fairly well-grown tubers which go in hot-bed the next spring. Mr. Arnold finds that rooted plants from such tubers are the more healthy.

I recently visited the forty-acre farm of Mr. George Maytrott, who has some twenty acres sweet potatoes of the "*Big Stem*" variety. On extended search through this potato field I failed to find any stem-rot or any other of the diseases of the sweet potato.

Mr. Maytrott ascribes this healthfulness to his practice of providing his soil fully with all the elements of nutrition for plants, especially gas lime and the ammoniacal liquor from gas works. He claims that if the plant be supplied plentifully with the appropriate food, it can resist all attacks of disease. As he quite plausibly says: "If the plant be kept healthy, it will never get sick." All growths on his farm verify this proposition.

I have not seen anywhere in our Union such unanimous evidence of prosperous health of vegetation. He uses, chiefly, stable

PLATE VIII.



Bush Sweet Potato. Grown by John Maytrott, Vineland.

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manure, but also the chemical manures known as commercial fertilizers, invariably applied broadcast.

There is nothing further to be stated in relation to sweet potato culture in Southern New Jersey.

Diseases of Sweet Potatoes and Their Remedies.

BY DR. BYRON D. HALSTED.

A study of the diseases of the sweet potato began at the Experiment Station during the growing season of 1889, when the writer made visits to the regions of the State where the sweet potato is a leading crop. In November of the same year a set of ten questions* was sent out to a large number of the leading growers of sweet potatoes throughout the State. A year later a bulletin† of thirty-two pages and nineteen engravings was issued, in which several of the diseases most troublesome to growers of sweet potatoes were considered. This pamphlet has long been out of print, and therefore there is sufficient reason for using some of the matter therein contained, along with a few of the engravings, for this digest of the same general subject. The diseases here considered are due to the low forms of plants belonging to the group known as Fungi and more familiar to crop-growers by such representatives as rusts and smuts in grains, mildew of gooseberry, pea and grape, and for larger members the various toadstools and puff-ball may be mentioned.

THE SOFT-ROT.

The fungi that attack the sweet potato are, speaking generally, microscopic molds that have the same habits of growth as those that feed upon bread, cake and other articles of diet. In fact one of them is the same kind, and is known to the housewife as the bread-mold, and a consideration of its structure and methods

* Special Bulletin J. The Sweet Potato Rot. November 30, 1889.

† Bulletin No. 76. Some Fungous Diseases of the Sweet Potato. November 28, 1890.

of growth and reproduction will answer for all other forms that may be described in this paper. This is the so-called soft-rot (*Rhizopus nigricans* Ehr.), and is met with in the field at digging time, but is frequently most destructive in the stove-room



Figure 1.
Sweet Potato
Soft Rot.

or cellar, where it quickly causes the potatoes to become soft and worthless. Figure 1 shows a root, reduced in size, in which the mold has penetrated for nearly the whole length, as indicated by the somewhat shriveled appearance of the rotted portion. Should there be a break in the skin at any point, as near *a*, this provides an easy entrance for the rot fungus. As a rule the roots become more or less bruised or cut, and in this way the natural barrier to decay, namely, the rind of the root, is removed. Care should always be taken in handling the potatoes that they become as little marred as possible.

In Figure 2 is shown at *a* a portion of the much-branched threads of the mold as they may be found in the substance of a rotting potato. These threads as they grow excrete a substance that is very active in dissolving the starch in the cells of the potato. In this way the juice from a decaying sweet potato is able to induce a similar rotting in healthy roots when it penetrates them.

After the mold has grown for a time it begins to form its reproductive bodies, namely spores (*h*), which are produced in dark capsules (*d*, *e*, *f*) on upright stalks (*c*), thus giving the so-called moldy appearance to the potato. The same development takes place upon the surface of bread when it remains long enough to become moldy. The spores are thus produced in great numbers, and, being light, are easily carried by the winds, and in this manner the germs of this mold-fungus become widely distributed. The soft-rot is, therefore, very contagious by means of its spores and also through the juice which the decaying potato develops. A third means of spreading is by the threads that may grow

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from one root to another as they lie together in the barrel or bin.

The soft-rot is greatly favored by a moist atmosphere surrounding the roots, especially shortly after digging, at the time when they are undergoing the process known as "sweating." At this critical time it is essential that the potatoes be stored in a well-ventilated, artificially-heated room that maintains a temperature of not far from seventy degrees, or that of a living-room. The experienced growers of this crop who keep their potatoes until late in the year are of one accord, that to avoid the soft-rot a stove or furnace of some sort is necessary in the storage-room. They are careful to reject any rotted roots at harvest time and remove any

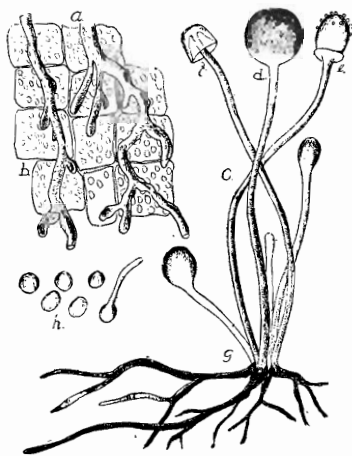


Figure 2.

Soft Rot. *a*, fungous threads; *b*, cells of potato; *c*, mold fungus, much enlarged; *d*, spore capsule; *e*, older stage; *f*, collapsed capsule; *g*, base of mold plant; *h*, spores.

that may afterwards appear in the bins during the period of storage.

THE BLACK-ROT.

Among the most common and dreaded of the decays of sweet potatoes is the black-rot. It takes its name from the fact that the affected root exhibits one or more dark-brown patches of irregular outline as viewed upon the surface. This decay spreads slowly through the potato and its interior is changed by it into a dark-olive substance that does not cook readily and is quite bitter and disagreeable to the taste. The black-rot develops in the roots during their growth in the soil and the sharp eye detects it at harvest time. Unlike the soft-rot, this

is a comparatively dry decay, and the diseased roots, after being properly stored, may remain for a long time without much loss from this trouble. The black-rot attacks the "sprouts" or "sets" as they are growing in the hot-bed, and this probably comes from the roots being diseased before they were placed in the bed. A root may look healthy and still have the disease to some extent, and by placing such a root in the conditions for sprouting the fungus is also favored in its growth and the tender shoots are easily attacked. A sprout that is badly diseased shows this by dark lines upon the otherwise nearly colorless lower part of the stem, and the tip, with its bud and unfolding leaves, may also turn brown and drop. All such sprouts, and in fact any that show the least trace of the black-rot, should be discarded when the sprouts are selected for setting in the field.

With the thought of testing the effect of various manures upon the amount of black-rot, a test was made by the Experiment Station in 1891 and published as Special Bulletin *M* in November of that year. It was found that there was only eighteen per cent. of affected potatoes upon the plots receiving no manures and forty-seven per cent. upon all the others. "The various kinds of fertilizers, as a whole, materially increase the percentage of the black-rot." It was observed that phosphoric acid at the rate of 640 pounds per acre greatly increased the yield of potatoes, without any corresponding increase of the black-rot.

While the investigations of the Experiment Station showed conclusively that the black-rot is a germ disease, they have not developed a specific remedy for the trouble. The fungus may be harbored from one season to another in some other plant than the sweet potato, but this is unknown. It may propagate in the manure heap where diseased potatoes are thrown, and thus be taken to the field and afterwards find its way to the young roots of the sweet potatoes. It is certain that it propagates rapidly and disastrously in the hot-bed, and here the main precaution is recommended. Those growers who are troubled with the black-rot should take all possible pains to use perfectly healthy roots for making sprouts. The material of the bed should be free from the germs and every attention given that the sprouts

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make a strong growth. If any black streaks appear upon the sprouts it may be wise to reject the whole lot and get plants from localities entirely free from the black-rot. It is probable that city manure favors the development of the black-rot and possibly contains the germs of the decay. Therefore commercial fertilizers and home-made manure of known composition are most desirable. The rule for heating and drying in the early days of the storing of the crop after harvest time is given under the previous head of soft-rot.

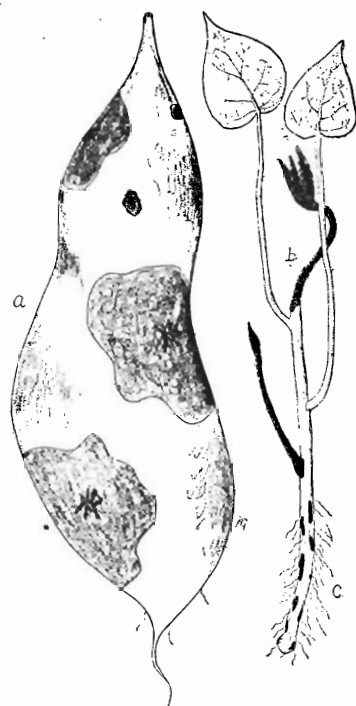


Figure 3.

Black Rot. *a*, potato affected; *b*, tip of diseased sprout; *c*, base of sprout with black rot.

Figure 3 shows at *a* a sweet potato affected with the black-rot and at *b* the tip of a sprout with the same disease, while the dark lines upon the otherwise white stem, and by means of which the trouble may be detected, are shown at *c*. The black-rot fungus has received

the botanical name of *Ceratocystis fimbriata* E. & Hals.

THE SOIL-ROT.

In many localities the soil-rot is the most destructive of all the troubles incident to the growing of sweet potatoes. The common name of "soil-rot," "field-rot" or "ground-rot" are given because the disease infests the earth and field and becomes known as one when the trouble is quite certain to occur. The attack is made upon the roots while they are still small and the infested portion ceases to grow. In this way the roots while slender may become constricted at certain places and produce

the appearance shown in Fig. 4. At *a* is a small root with

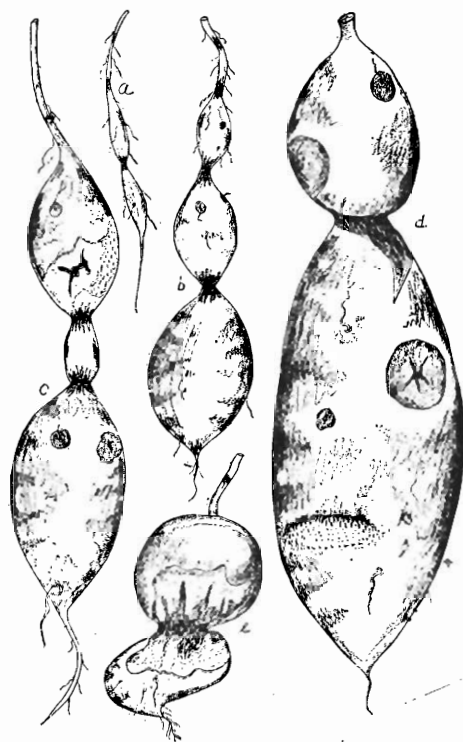


Figure 4.

Soil Rot. Five potatoes affected with the disease.

two rough-coated places where growth has been stopped, and at *b* and *c* is shown potatoes as they frequently appear at harvest time, and, of course, are unfit for market. At *d* and *e* are other forms drawn from nature. Sometimes the disease attacks small side roots and spreads into the main ones, making a circular patch of dry, brown substance. This decay does not seem to spread after harvesting of the roots, but the decayed places furnish favorable entrances for other fungi that may quickly destroy the potatoes. In short, the soil-rot prevents the formation of well-shaped potatoes, and those that are produced are badly "marked," as it is termed, and are unfit for the table.

The trouble remains in the field from year to year and attacks the young roots directly from the surrounding soil, and therefore it is evident that its eradication is not to be sought in any spraying or treatment of the vines above ground. This fact led to a series of trials in the field by the Experiment Station that extended over a number of years, and the results are given in the annual reports. The results of the trials of many substances show clearly that this soil-rot may be held in check by the use of flowers of sulphur. It is also determined that Kainit has a beneficial action, and, in combination with sulphur, comparatively clean roots may be produced upon land thoroughly filled with

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the germs of the disease. The experiments indicate that three or four hundred pounds of both substances per acre may be used and the best results are to be expected where the two substances are mixed thoroughly in that portion of the soil where the roots are to develop. The botanical name of *Acrocystis batatas* E. & Hals. was given to the fungus causing the soil-rot.

THE STEM-ROT.

There is a disease of the sweet potato that is quite different from those already mentioned and causes much damage in some

fields. This is called the stem-rot, and is so named because it attacks the vine at, or close to, the surface of the soil and from these the decay extends down into the potato, and in the opposite direction along the vine to the end, unless it has taken root at some joint where the tip may remain green. This dying of the vine is often followed by the formation of new shoots in the center of the diseased "hill." This is due to the roots putting out sprouts from below the decayed portion, but such attempts are of

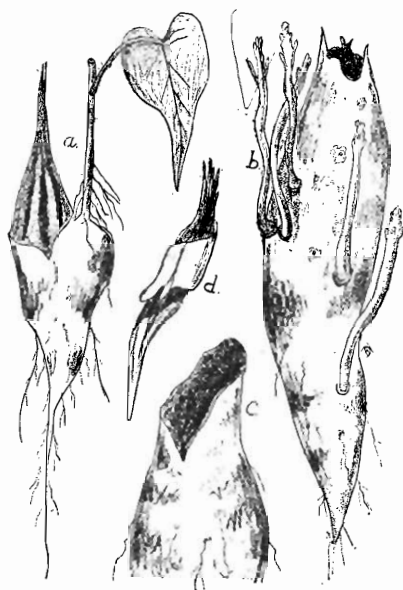


Figure 5.

Stem Rot. Showing different stages of the disease.

no profit, for the season is too far gone for the second plants to produce marketable roots. Figure 5 shows the appearance of roots that are affected with the stem-rot. At *a* the upper portion of the root is shown dead and a sprout has grown up from the living part below. At *b* a larger root is shown with several young sprouts, while at *c* is the upper half of a root with the end

destroyed by the disease. At *d* is a small root that is nearly wholly destroyed by the rot. The sets that fail from the stem-rot in mid-summer are many in some localities and the trouble appears to be on the increase. Some varieties are more subject than others to this disease, and growers will need to make a study of this latter point.

The fungus causing the stem-rot seems to be one that attacks other plants, as, for example, the eggplant, and in the same way as the sweet potato, namely, near the surface of the ground. It is also probable that the fungus infests rubbish and may come to the field in the manure that is used. First of all, as a precaution, all vines that become diseased should be burned as they may be found during the growing season, and at harvest time the refuse of the field should be disposed of in the same way. In like manner the vines of cucumbers, squashes, melons, eggplants, tomatoes, potatoes, etc., may well be taken to the burn-heap instead of to the compost-heap, as they all contain germs of one kind or another that are a menace to truck-growing.

As with fields infested with the soil-rot, so here it is important to practice a rotation of crops that will eradicate the germs as much as possible from the soil.

MINOR DISEASES.

The Dry-Rot.—The four diseases above named are usually the leading ones that trouble the sweet potato grower. There are, however, several others, one of which is the dry-rot. This is due to a fungus also, and it causes the affected parts to become dry and hard, with the surface roughened by numerous pimples in which the spores are produced. As yet there seems to be no cause for alarm, but growers should destroy all such potatoes, for if left to themselves the disease may increase to a troublesome extent.

White-Rot.—This is also a dry-rot, and the affected parts may become white almost like chalk, and of course are worthless. It seems to be associated with rough handling of the roots, as the white potatoes are usually in connection with bruises or deep scratches.

DISEASES OF SWEET POTATOES.

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Scurf.—The brown and somewhat rough coating often met with upon sweet potatoes and sometimes called “rust” and “cloudy” is due to a fungus that is not more than skin-deep. In some soils this scurf is upon nearly every root, while in other localities the roots are “bright,” or, that is, free from it. It does not directly do much injury to the roots, but the rot germs find a better foothold upon the rough surface, and, therefore, scurfy potatoes may not keep as well as others. The treatment for the soil-rot was quite effective in keeping off the scurf.

Leaf Diseases.—There are some fungous diseases of the foliage of sweet potatoes, the chief of which are the leaf blight (*Phyllosticta bataticola* E. & M.) and the leaf mold (*Cystopus Impomæ panduranæ* Farl.). The former causes numerous dead spots in the leaves that are injurious and the latter forms white blisters on the foliage and large distortions of the stems. Neither are of sufficient importance to need any serious attention.

December, 1903.

Diseases of the Potato in Relation to its Development.

BY PROF. L. R. JONES, UNIVERSITY OF VERMONT.

The Diseases of the Potato in Relation to its Development.

BY PROFESSOR L. R. JONES, UNIVERSITY OF VERMONT.

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The Diseases of the Potato in Relation to its Development.*

BY PROF. L. R. JONES.

Mr. Chairman and Delegates:

I realize that the time is brief, but I must use a moment in expressing the pleasure it gives me to come from the Vermont University and Experiment Station to bring greetings to the officers of your college and station and the other agriculturists assembled here. Our institution owes much to New Jersey. It was as an officer of your station that our Dean and Director, Professor Hills, received a part of his early training, and I feel that much of my own inspiration has come from contact with your able botanist, Professor Halsted. At the beginning of my work at the Vermont station I asked Professor Halsted's advice as to the most important lines for investigation. His reply was that I make a special study of the diseases of the potato, especially as to the leaf blights and rot and remedies for these. It is, therefore, especially fitting that upon my first return to New Jersey I should take the opportunity to make a report of progress upon these problems.

Although the diseases of the potato have particularly taken my attention, I have incidentally been observing agricultural progress in Vermont, and I believe there is nothing more fundamentally important to our farmers than the development of greater confidence in their business. This must come from a completer sense

*This lecture was illustrated by lantern slides of which a number are reproduced on the following pages. Some portions of the lecture descriptive of slides not reproduced here have been omitted and the author has instead amplified certain points more fully than he was able to do in the lecture.

of mastery over the forces of nature with which they are constantly dealing. What are some of the things which are hindering this? In certain phases of crop production I believe nothing has done more to retard this fuller confidence on the part of the crop grower than his baffling experiences with plant diseases. He is able to handle the normal plant, but as soon as disease attacks it he loses confidence in his ability to master it. But a few years since it was the common belief that these plant diseases—mildews and blights—as well as insect pests, were a Divine visitation, and that any attempt to check them would be an interference with Providence. More recently we have inclined to the idea that if only we succeeded in our investigations we would find a particular parasite, insect or fungus responsible for each malady, and that, having discovered the parasite, we could hope with certainty to destroy it by spraying. The results of spraying in recent years have indeed been wonderful, and it is a part of my mission here to increase your confidence in the efficacy of such remedies; but I wish to emphasize that many have over-rated the relative importance of spraying. The study of the parasite and the use of the spray pump in checking it is only one part, and perhaps the last part in our work in controlling plant diseases. Each year brings to us a fuller realization of the importance of understanding more fully the fundamental principles of plant nutrition and growth, that we may secure the fullest strength and vigor in the plant and so enable it to ward off these diseases. Having thus secured the most vigorous plant by the best cultural methods, we then may spray this plant with profit to preserve that health and vigor against the parasites. The first speaker of the afternoon, Professor Voorhees, clearly emphasized the importance of the point I would make, viz.: that we should study carefully the history and development of each plant, remembering that each has its peculiar needs as a living individual. These plants, like the domestic animals, are our servants, ready to give us faithful and profitable return, providing we give them the chance.

I would especially emphasize this afternoon the importance of a consideration of the diseases of the potato and their control from this point of view. The potato has long been one of the

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most commonly cultivated plants of our fields and gardens. Yet it is the most variable in yield of our standard crops and the most liable to diseases and failure from causes the least understood. Why is this? A partial explanation may be found in the fact that it is a semi-tropical plant which has been brought under cultivation in the northern climate by rapid and intensive breeding. Our season of growth is shorter by one-third, or even one-half, than that of its natural habitat. There it reproduces itself primarily by seeds, and secondarily by tubers. Here, by breeding and selection, man has so changed the conditions that seed production is almost unknown, while the size and number of the tubers are enormously increased.

For information upon these points I am largely indebted to Mr. Cyrus G. Pringle, the botanical explorer, who is thoroughly acquainted with the potato, both wild and cultivated, as it occurs in Mexico. In the gardens there it is planted in March and harvested in December. The period of blossoming and maturing of seed is in August and September, whereas the tubers are formed one or two months later.

Reproduction by seed is a sexual process, that by tubers is vegetative. Both are exhaustive of vital forces. The two are, therefore, in a physiological sense opposed, and cannot well be carried on at the same time. Under the natural condition of the wild plant the seed precedes, with our shorter season and intensive culture we have crowded the two processes together until they tend to overlap. That is, we have forced the tuber production back into the period which in the wild plant is given to the production of flowers and seeds. As a result we have, just after the potato plant comes into blossom, a strained and unnatural condition; a state of physiological tension, of stress between two opposing vital tendencies. According to the mode of its ancestors the major part of the plant's energy would then be tending upward toward flower and seed; but tuber production in the high-bred specialized plant begins immediately, and the acquired tendency is for this process to claim the major part of the food.

As a result of this conflict of tendencies in the plant there occurs a *critical period* during which the continued health of the plant, if not its very life, hangs in the balance.

Whether this explanation is correct or not, the fact is certain that the fortnight including and immediately following the blossoming period is the turning point, the crisis in the life of the potato plant.

The production of a profitable crop depends more upon its protection at this period than at any other during its growth. Before this time it will quickly recover from very severe ravages of insects; a little later it will do the same; but serious injury to the foliage or arrest of development from unfavorable soil conditions at this period will start the plant upon a decline which is disastrous to the crop of tubers and leads to the premature death of the plant; and, in my experience, no subsequent treatment makes amends for neglect at this time. If, however, the plant is carried in full vigor through this critical period, it starts upon what is virtually a new lease of life, a vegetative period which, with the more vigorous varieties in our northern climate, seems to have no natural terminus. The length of the subsequent period of vegetative development seems dependent not on internal factors primarily, but on external conditions, chiefly climatic, which have so varied at Burlington during recent years as to bring successive crops of the same variety and on the same soil to so-called maturity at dates varying from September 25th to November 10th. It is during this second or vegetative period that all of the marketable crop is developed. It is for this that we have grown the plant, and it is important, therefore, to inquire more exactly when and at what rate this development occurs. In order so to trace the relative rate of growth of the crop, we have during three seasons at the Vermont station made a series of partial diggings at ten-day intervals from the blossoming period through to full maturity with vigorous varieties, carefully cared for and sprayed. This has covered a period of about seven weeks, and has revealed the surprising fact that there is fully as great a rate of growth during the last half as during the first half of this seven-week period. The following results of one such season's digging is typical of them all.

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THE DEVELOPMENT OF THE POTATO TUBER.

WHITE STAR POTATOES, PLANTED MAY 20TH, AT BURLINGTON, VT., YIELDS AND SIZE OF TUBERS AT DIFFERENT DATES.

Date of digging	Total yield per acre	Yield of marketable size	Average size of tubers
Aug. 2,	58 bu.	30 bu.	1.6 ounces.
" 12,	115 "	75 "	2 "
" 22,	230 "	163 "	3.7 "
Sept. 1,	304 "	234 "	4.4 "
" 12,	356 "	303 "	5.2 "
" 22,	379 "	353 "	5.7 "

I fully realize that the dates indicated above, although typical of Vermont, would not hold under New Jersey conditions of culture and growth; but I am bound to believe that your potatoes grow in much the same way that ours do, and the main conclusions must be true for New Jersey as for Vermont, viz.: that anything which interferes with the fullest possible development and longest retention of healthy foliage following the blossoming period means a proportional loss in the profits from the crop.

It is noteworthy as indicating how little the fundamental importance of the continuous health of the plant during this vegetative period is appreciated, that the date of its beginning is almost coincident with that when the average potato grower abandons his plants to weeds, insects and blights. The thrifty New England farmer is ashamed to have his neighbors see weeds or bugs in his fields before this period, but, on the other hand,



Fig. 1.
Flea Beetle
X 5.

he feels called upon to defend, if not to apologize for his course, if later than this he pulls weeds or sprays to protect his plants. Yet the beginning of this vegetative period is the very time when certain insects, notably flea-beetles and grasshoppers, do their worst work; and it is often serious work, indeed. If a period of dry weather follows, and if the soil is either caked or weedy, tip-burn is the inevitable result; and when this begins it is as a rule prophetic of the steady decline of the plant to its death. Tip-burn is a physiological disease due to inadequate water-supply. The potato requires more water than do most plants; indeed, the

production of a full crop demands that fully one-fourth of all the water that falls on the soil during the entire season shall be ab-



Fig. 2.

Potato leaf badly eaten by flea-beetles.

sorbed by the plant, and either retained or cast off through its leaves. Moreover, the time of most active demand for this



Fig. 3.

Single hill from field shown below, where sprayed with bordeaux mixture.



Fig. 4.

Single hill, not sprayed. The upper leaves cut off by grasshoppers.

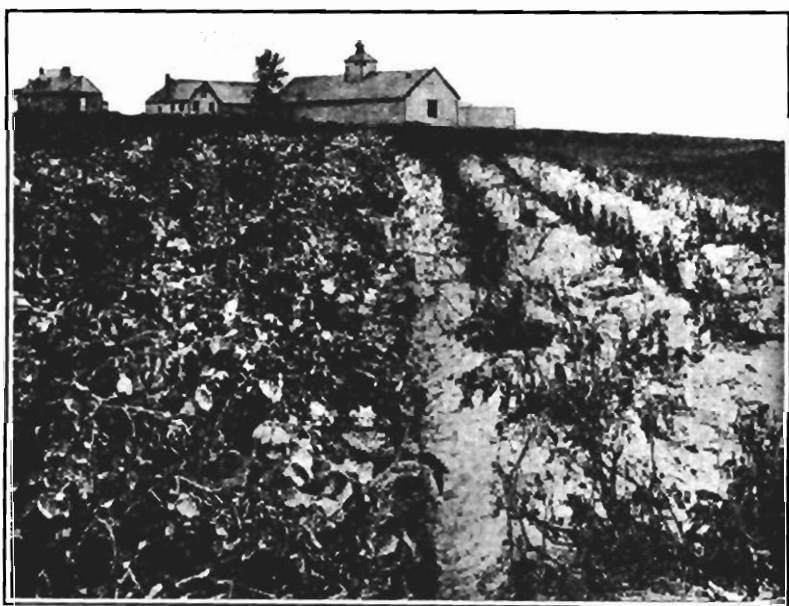


Fig. 5.

SPRAYED.

NOT SPRAYED.

Experimental potato field, photographed August 31st, 1894. The beneficial effects, shown at the left, were chiefly due to checking the attacks of grasshoppers and flea-beetles.

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water is at and shortly following this critical period. The securing of this water-supply is dependent upon three things. First, the water-containing character of the soil, determined by humus-content and thorough pulverization. Second, surface tillage to conserve this. Third, healthy foliage to carry on transpiration,

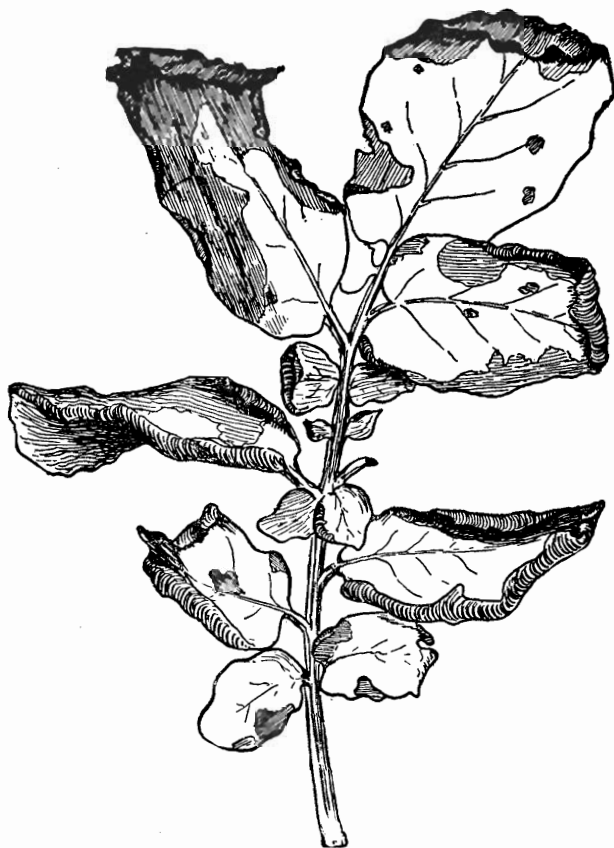


Fig. 6.

Tip-burn of the Potato Leaf.

which is the pumping process in plants. Much of the so-called "blight" of potato foliage is really tip-burn, due to insufficient attention to one or all of these things.

Starch manufacture is scarcely second to water supply in importance for tuber formation; this occurs entirely in the green

leaves under the invigorating influence of sunlight. The extent of healthy surface is, therefore, an exact index to the capacity for starch formation. When it is remembered that one-half of the possible crop may be formed after the third week in August, the importance of the preservation of the healthy foliage through the early autumn becomes apparent. Certainly the average potato grower has no just conception of his dependence upon this late foliage for a full crop. As evidence of this we are frequently asked by intelligent farmers whether there is not danger of their plants "running to tops" as a result of the spraying, and whether, in that case, they should not prune them back or break them down. In one case last summer a man who had sprayed and thus secured a fine stand of healthy plants was advised by his neighbors that he was ruining his crop and must cut the stems back. About the middle of August he wished us to visit his field and advise him in the matter. We did so, and offered on behalf of our Experiment Station to pay him for possible loss if he would cut back the tops by one-half in alternate rows in his field and report the outcome to the station. The result was a yield of one hundred and fifty-two pounds where pruned, as compared with two hundred and twenty-one pounds where unmolested. In one form or another this misunderstanding of the necessity of healthy foliage for full tuber production is so common that we have been led to seek for its explanation. Apparently it is chiefly founded on two misconceptions. The first is based on the fact that certain conditions, such as moist, cloudy weather, which lead to the growth of rank foliage, do not give correspondingly large yields; but a moment's thought shows that the difficulty here is not that there is too much foliage, but that there is too little sunlight. The second and more general misconception is the confusion of the principles governing seed production, as it occurs in apples and tomatoes, with those governing vegetative reproduction as it occurs in the potato. It is a common practice to stimulate the former by pruning, and the inference is wrongly made that the same process may give like results with the latter.

But the greatest enemies of the New England potato crop in this latter stage of its development are the diseases due to fungi or bacteria—the blights and the rots.

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What can be said as to remedies for these and for the insect pests of this period? In the first place, let us again emphasize the importance of more attention to soil conditions—humus, tith— and to cultivation with the view of increasing and conserving the water-supply. These make the large crop possible. Having done this, *one cannot afford not to spray*. As a result of comparative trials of a wide variety of fungicides and insecticides extending over thirteen years, at the Vermont Experiment Station, we have found Bordeaux-arsenic mixture to be an almost perfect preventive of all the diseases and insects attacking the foliage of our potato plants in the later stages of their growth. It is apparently almost worthy the title of a “cure-all.” During this time we have not failed once in carrying the foliage upon vigorous late potatoes to practically full maturity by making from one to three applications of this mixture following the blossoming period. The various dates of spraying and the gains therefrom are briefly shown in the following tabular summary:

GAINS FROM THE USE OF BORDEAUX MIXTURE ON LATE POTATOES.

VARIETY.	PLANTED.	SPRAYED.	YIELD PER ACRE.		Gain Per Acre.
			Where sprayed.	Where not sprayed.	
White Star,...	May 11, 1891,	Aug. 26, Sept. 8.	313 bu.	248 bu.	65 bu.
“ “ ..	May 20, 1892,	July 30, Aug. 13, 25, ...	291 bu.	99 bu.	192 bu.
“ “ ..	May 20, 1893,	Aug. 1, 16, 29,	338 bu.	114 bu.	224 bu.
“ “ ..	Apr. 26, 1894,	June 16, July 17, Aug. 30,	328 bu.	251 bu.	72 bu.
“ “ ..	May 20, 1895,	July 25, Aug. 13, 31, ...	389 bu.	219 bu.	170 bu.
Polaris,	May 15, 1896,	Aug. 7, 21,	325 bu.	257 bu.	68 bu.
“ “ ..	June 1, 1897,	July 27, Aug. 17, 28, ...	151 bu.	80 bu.	71 bu.
White Star,...	May 10, 1898,	July 21, Aug. 10,	238 bu.	112 bu.	126 bu.
Average 3 yrs.,	May 18, 1899,	July 26, Aug. 17, Sept. 8,	229 bu.	161 bu.	68 bu.
Delaware, ...	May 23, 1900,	Aug. 4, 23,	285 bu.	225 bu.	60 bu.
“ “ ..	May 25, 1901,	July 20, Aug. 21,	170 bu.	54 bu.	68 bu.
“ “ ..	May 15, 1902,	Aug. 1, 20,	298 bu.	164 bu.	134 bu.
Averages for twelve years,			280 bu.	165 bu.	115 bu.

In comparison with this mixture we have tested every other fungicide of any promise which has come to our attention, and find nothing equal to it in the fresh home-made form, although some of the ready-made Bordeaux mixtures on the market are excellent. Let me add my testimony that Bordeaux mixture varies widely in character, depending upon the way it is made.

Two practical questions are frequently asked, which have not as yet been touched upon. First, the relation of date of digging to the development of rot, *i. e.*, whether, in case the blight has killed the tops it is better to dig the crop at once, or let it lie for some time in the soil. There will be serious loss from rotting in the soil in the latter case, and from rotting in the cellar in the former. Which is the lesser of the two evils? During the last two seasons in Vermont the blight has been serious, and unusually good opportunity has been offered for testing the matter. Experimental diggings were made each of these seasons by the Vermont station at four dates, ranging from about August 25th to September 30th. Seven fields were thus investigated, including various conditions of soil and disease, none of them having been sprayed. The results are summarized in the following table:

<i>Dates of digging.</i>	<i>Aug. 25, 31.</i>	<i>Sept. 6, 7.</i>	<i>Sept. 14-21</i>	<i>Sept. 28, 30.</i>
Average total weight per row when dug,	150 lbs.	153 lbs.	152 lbs.	142 lbs.
Weight of sound tubers, September 28-30,	80 lbs.	117 lbs.	133 lbs.	132 lbs.

Without going into the details, we would say that as nearly as we can formulate conclusions based upon these trials of two years, it is that where the tops have blighted and there is danger of rot, much more of it will occur in the cellar than in the field, and, therefore, it is better to delay the digging until some ten days or more after the last tops are dead; and a longer delay will do no harm.

The other question is as to whether there is hope that science will suggest some way to rid us of these diseases other than by the troublesome method of spraying. It has not done so up to the present time, therefore it behooves us to spray; but will it in the future? So far as known the late-blight fungus lives over

the winter only in the tubers, and is perpetuated from year to year in such infected tubers used as seed. If so, cannot they be disinfected? Unfortunately, this fungus is not, like the potato scab germs, lodged on the surface; it is internal, and, therefore, chemical disinfectants offer no promise. Unquestionably, however, more attention should be given to the selection of unaffected seed. The thought is worth suggesting, at least, that if every potato grower in this country were to plant sound seed potatoes for one season the fungus might go out of existence, so far as we are concerned, until again imported.

There is another hope, however. The variability shown by man and the domestic animals in individual power of disease-resistance had led plant breeders in recent years to give increasing attention to the possibility of such individuality of resistance in plants. It has long been known to horticulturists that this occurs with some varieties, at least, toward certain diseases. For example: A few varieties of apples are perfectly resistant to the rust, and some to a lesser degree resistant to scab. Recent investigations by botanists of the National Department of Agriculture have led to the discovery of remarkable disease-resistance in individual cotton plants and in cow peas, and, moreover, this is perpetuated in the offspring, so that seed of these "ironclad" races are now being distributed by the Government to the Southern farmers. Plant pathologists and plant breeders should be stimulated by these results to renewed courage in their research for resistant varieties and individuals in other kinds of pest-ridden cultivated plants. A blight-proof potato may not be an impossibility.

Questions addressed by delegates to the speaker during the lecture and at its close led him to make the following supplementary statement:

Bordeaux-arsenite mixture has proved superior to every other remedy for potatoes during the latter part of their growth.

The composition of this may well vary within limits according to climatic and disease conditions, but that now used at the Vermont station generally consists of six pounds copper sulphate (blue vitriol), four pounds lime, fifty gallons water, with one-

half pound of Paris green, or similar arsenical poison, added. A good formula, and easily remembered, is five pounds sulphate, five pounds lime, fifty gallons water.

This may be applied in any way to secure uniform and economical distribution; bucket pumps and knapsack pumps are good in certain cases, but a larger pump attached to a barrel or tank and mounted on a two-wheeled cart is in general to be recommended. This may be a hand pump for smaller fields, but should be a power pump for large ones. Such a cart and horse passing through the field do little damage if managed aright.

The Bordeaux and other "dust sprays" similar to the wet Bordeaux mixture in chemical composition are useful and, under some circumstances, to be recommended. They have never proved equal to the wet mixture, probably partly because coarser and partly because less adhesive. They also vary slightly in chemical composition. If used it should be with the realization that they are less effective, and therefore must be applied more frequently and more liberally.

No harm will result from excessive application of properly-made Bordeaux mixture or from Paris green if combined with this or other lime mixture.

From one to three applications of Bordeaux mixture have proved sufficient for potatoes, under Vermont conditions. In New Jersey one or two more might be required; *i. e.*, two to five altogether.

The date and frequency of spraying for best results will vary with variety, climatic and disease conditions. In all cases one must remember that this treatment is a *preventive*, not a *cure*. It must be begun *while the plants are still healthy* and repeated often enough to keep them free from serious insect and fungous attacks. In general it is best to begin at about the blossoming stage—a little later will do in Vermont—perhaps a little earlier would be better in New Jersey. Repeat the application at intervals of from one to three weeks, so long as there is danger of injury to the plants. Beginning too early will do no harm, waiting too late means certain failure; therefore, if in doubt, begin early.



Total yield of marketable potatoes from two rows sprayed.



Total yield of marketable potatoes from two rows not sprayed.



SPRAYED.

NOT SPRAYED.

Fig. 7.

From photograph of experiment station potato field, September 10th, 1892, showing results of three applications of bordeaux mixture in preventing phytophthora injuries.

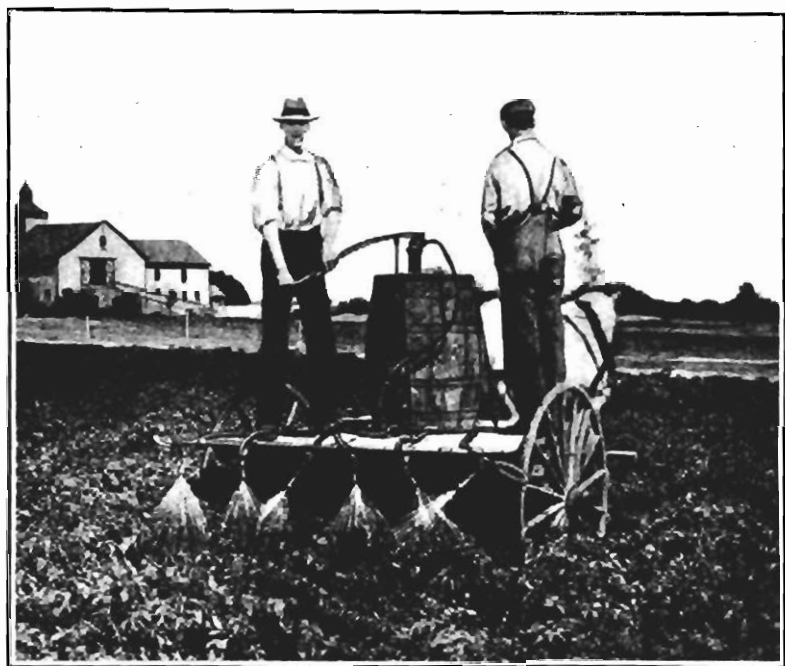


Fig. 8.

Spraying potatoes at the Vermont Experiment Station.

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If rain falls before the mixture has dried, the spraying should be repeated within a few days thereafter. The mixture dries quickly, however, and if rain does not begin until a few days after the spraying is completed, it is not readily washed off. The lime makes it very adhesive and, for this reason, much superior to the "dust sprays" in a wet season.

Apply in liberal amounts. Too much will do no harm, too little is ineffective. Aim to cover every leaf with a film of the mixture. This will require amounts varying with the foliage development and apparatus used—from two to five barrels per acre (100 to 250 gallons) each application. Most men at first err by using too little. The geared pumps having only one nozzle over each row apply too little as a rule, and, if such are used, the field should be gone over twice each application, or else sprayed at more frequent intervals.

There are two fungous diseases causing leaf blight, the early and the late blight. The latter is followed by the rot. This spraying suffices to prevent both, as well as the flea-beetle and other insect injuries. There is a bacterial blight, a sort of wilt disease, followed by rot, which occurs in New Jersey and the South, that must be controlled in other ways.

Two men using a good cart with hand pump should spray four to six acres a day if water is convenient. A geared pump covering four rows at a time should enable them to cover nearly twice this ground.

The same mixture is used in spraying apples and pears to keep from scab and leaf spot diseases. It is possible in this way to secure almost perfect crops of pears and apples and greatly to improve the quality of apples. Thus, by spraying Flemish Beauty pears in Vermont the proportion of first-class fruit was increased from 55 per cent. on the unsprayed trees to 94 per cent. on the sprayed trees, and the market value of the crop thereby practically doubled.

In the case of Fameuse snow apples, one season the gains were for a crop worth \$2.15 per tree where not sprayed to one worth \$15.44 per tree where properly sprayed with this mixture.

Hints on Squab Raising.

BY GEORGE L. GILLINGHAM.

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Hints on Squab Raising.

BY GEORGE L. GILLINGHAM.

The production of squabs for the markets of our large cities is an industry that is reaching considerable proportions in this State. Although the numbers are growing yearly, yet the prices seem to be advancing, showing the demand to be unlimited. The great scarcity of game all over our country compels the keepers of the first-class hotels and restaurants to look for something to take its place, and at the same time be sure of a supply at all seasons of the year. Therefore, they have hit upon the squab to fill this void. And now, when one calls for quail on toast or orders of that kind, it will very often be found that the quail was raised in a pigeon loft in New Jersey, is much younger, more tender and juicy than the quail would have been, could it have been found.

This is a business that can be conducted in connection with poultry raising, and is one well adapted to village lots by women and young persons, if need be, or by those whose other business takes their attention during the middle of the day, as the labor connected with it is not heavy. It is particularly adapted to women who wish to add something to their income. In fact, women are more apt to succeed in it than most men, as it requires close attention to the little things, and it is the many small things that go to make the final profits in the end. Women, as a rule, are more patient and more thorough with small details, and are, therefore, more successful.

The extent to which this industry is conducted in some parts of the State may be shown by stating that in one town in Burlington county of about 3,000 inhabitants, the purchases of one dealer the past year were 56,582 squabs, for which he paid \$16,400, while

another buyer in the same town bought a little over half as many more, bringing the aggregate to 86,000, for which the growers received nearly \$25,000. Another grower in the same county shipped from his own loft between 13,000 and 14,000 birds.

The cost of feed and care for a working loft of pigeons is about \$1.00 per pair per year; some put it much lower, but at the present price of feed, if proper care is given, we should not figure much lower than this.

A good pair of birds should produce from seven to ten pair per year, generally an average of not over eight. The prices have ranged for the past year from 25 cents for the poorest to 75, 80 and even 90 cents for the best.

The buildings and equipment need not be expensive, but according to the taste and means of the builder, and the amount of capital he wishes to put into the business. The houses should always be placed where the drainage is good, preferably upon a dry knoll facing the south or southeast.

Some paying lofts have been made by fitting up unused wagon-house or wood-house lofts, or even over hen houses. Other houses have been constructed for poultry on the ground floor and the story above used for pigeons. In this case great care must be exercised to have the floor well laid with ploughed and grooved flooring, to keep vermin from passing up from the poultry. When houses are built on the ground, the floors should be made of cement, to insure perfect dryness; a floor one and one-half to two inches thick will be sufficient, as there is very little weight on these, unlike a stable floor for horses or cattle. These, as well as the board floors above, should be covered one inch deep with dry coarse sand.

Attached to and in front of the house a fly should be constructed, to afford exercise for the birds in the open air and sunlight. These should be the full width of the house, or single sections of each house, and extend out fully twenty-five or thirty feet in front. The frame of the fly is made of hemlock posts two by three inches and eight feet above the ground; these are fastened together at the top and bottom, also at the middle, with hemlock boards six inches wide. On these are nailed wire netting of one-inch mesh, not larger, or you will feed more sparrows than

HINTS ON SQUAB RAISING.

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pigeons. Avoid any cross-boards in the middle of the fly to obstruct the flight of the birds, as this would often result in injury of birds on occasions of sudden fright. Upon these posts, near the top, fasten brackets, and nail to them boards six inches wide, to furnish the birds with a place to alight and walk when not in flight.

Very large flocks should not be kept in one room; from fifty to one hundred pair is enough to keep together for the very best results. A room ten by twelve is ample for fifty pairs of working birds. A house may be built of any desired length, twelve feet wide, divided into apartments, of the size I have stated, by wire partitions, with doors hung on spring hinges, to facilitate passing through in feeding.

These houses should have windows on the south side of sufficient size to afford ample light in all parts of the house, and no more, as too much glass makes the houses too cold on winter nights.

Around the sides of these rooms nests should be constructed, ten by twelve inches and eight inches high. I will describe these nests. They are made with boards ten inches wide, and on to these nail strips one inch square eight inches apart, fasten the edge of these against the side of the house twelve inches apart, extending from the floor to the ceiling. When in position boards cut twelve inches wide, with cleats three inches high nailed on one side, are placed on these strips, and form the bottom of the nest, the three-inch cleat forming the front, to keep the nest in place and the young from falling out.

These nests occupy the entire side of the house with no waste space, and no outside foot-rest for birds to light upon and run along in front of the nests and fight and drive others from the nests, as cross birds sometimes do, and the one in the nest has the advantage.

Some breeders use square boxes, hung on hooks, but these are not as economical of space, not as easily cleaned, and also have many places for quarrelsome birds to interfere with others.

In cleansing those just described, the bottoms are pulled out like a drawer, and with one stroke of a trowel are cleaned and replaced.

As each pair requires two nests (as they are often sitting in one nest while raising a pair of birds in another), there should be twice as many nests as pairs of birds, with eighteen to twenty to spare, that they may take their choice.

The period of incubation is eighteen days, the hen sitting on the eggs, excepting about four hours each day, when the cock takes her place, while she is feeding and resting.

During incubation a substance forms in the crop of both birds, known as pigeon milk or curd, on which the young are fed for the first five or six days, until they are old enough to digest grain, which is carried to them in the crop of the old birds, and which is ejected from their mouth to the mouth of the young bird by the same process as the pigeon's milk is fed in the first place.

It is important that the proper feed be given, which should consist of a variety of grain and seeds, the larger the variety the better.

Cracked corn, rather coarse, preferably about three or four pieces from a single grain of corn should be fed in troughs or hoppers so constructed that they cannot throw it out and waste it, which they will frequently do in search of other seeds of which they are more fond.

The other seeds should consist of whole wheat, Canada field peas, Kaffir corn, hulled oats, millet and hemp seed.

These should be fed on the floor twice daily all they will clean up quickly, feeding the hemp but twice or three times per week, except in the moulting season, when a small quantity may be fed each day, as hemp is very fattening, and if fed in excess bad results may follow.

Do not feed wheat too liberally, and always mixed with other grain, using the hard red wheats, and never new wheat, as it has a tendency to loosen the bowels of the young birds with sometimes fatal results.

In connection with the feed they should be furnished with ground oyster shell for grit, also a liberal supply of salt, and small bits of charcoal and gravel; the salt is necessary to keep them in good health,

These substances may be kept in small boxes around the houses, where the birds can have free access to them. A generous

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supply of pure water should be kept before them at all times, near the feeding troughs, and should be supplied each morning before feeding, that the old birds may have access to it immediately after feeding before taking the feed to their young.

Drinking fountains may be used if care is taken to keep them perfectly clean in summer.

Metallic ones may be used in winter to prevent loss from freezing. In our practice we have found open wooden buckets very satisfactory, the birds perching on the edge to drink; they are easily cleaned, and the birds seldom getting in them to foul them.

In stocking the houses always avoid using common birds, as the results will be disappointing; they are not prolific, and are more liable to produce dark squabs, which always bring the lowest price in the market, and do not feed their young as well as full bloods.

The best all-round bird for squab raising is the American Antwerp or Homer, as they are the most active, good workers, quiet disposition, and the best of feeders. Other good varieties are the White German Homer, the Belgian Homer, the Dragoon, the Duchesse and the Runt, in the order in which they are mentioned.

The White Germans are the handsomest of birds, with pure white plumage, red legs, and red warty skin around the eyes. They are very prolific, and somewhat smaller and not as good feeders, and the young not as large for market as our homers. The cross between the two homers make the ideal bird for market purposes, as you seldom, if ever, have a dark squab.

The Belgian Homer is a short-bodied, plump-breasted bird, and produces very full-breasted squabs, but not as large as our homers.

The Dragoon is a larger bird than either of the other three, but it takes five weeks for them to grow a pair of birds, while the others will complete the process in about four weeks, a difference of feed and cost which amounts to considerable in a year from a large flock.

The Duchesse is a large bird, but slow as a breeder, with heavy feathered legs and feet, which is a detriment in dressing,

as well as a liability of breaking the eggs or throwing them out of the nest if leaving the nest quickly.

The Runt is the giant among pigeons, as well as the slowest and poorest worker, seldom producing more than four pairs of squabs per year; they make a good cross with the Homer or Dragoon, but even then will not produce as many as either of the other two alone.

The squabs are dressed for market once a week on regular shipping days; they are dressed just before they are large enough to leave the nest and when they are full feathered, and should weigh at this time eight pounds per dozen, this size commanding the highest price, the price falling off very fast as the size drops from this weight.

The squabs should be dressed with empty crops; they may be caught in the morning before feeding, or caught the evening before after the old birds have fed them for night, and kept in hampers until morning, when their crops will be just in the right condition.

After the young birds are two or three weeks old, the old birds build another nest and begin to sit again, the cock bird taking most of the care of the young until they are ready to leave the nest. Thus a good pair of working birds have a pair of young and a pair of eggs a large portion of the time.

It often happens in a business of any kind that a close attention to some of the little things amounts to considerable in the course of a year.

In this business this is very important; it frequently happens that one egg gets broken or one proves unfertile, leaving but one bird hatched; when this occurs in two nests hatching near together, both young birds should be placed in one nest, as the old birds will grow both for market as quickly as one and the other pair go to building again. With a large number of birds the income may be very materially increased in this way in a single year.

Great care should be taken, however, how this is done; if there is a difference in the age of a day or two, always place the older bird in the nest of the younger, rather than vice versa, as the parents of the older bird may have used all the pigeon milk

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and have begun to feed grain, which the younger could not digest and which would cause trouble and perhaps death, while the older bird would still take the feed the younger one was receiving and thrive on it.

A careful watch should be kept for lice, which, if allowed to get into a house, will be hard to get rid of and cause great loss. If tobacco stems are used for nesting material, and no other substances used, there will very rarely, if ever, be any trouble from this source.

A pile of these stems should be kept in one corner of the house at all times, and the birds will make free use of it, using what they need, building their own nests, which should be cleaned out and taken from the house after each pair of squabs have been removed.

During the summer months the birds should be furnished with a shallow tub of water in which to take a bath two or three times a week, which will help them to keep free of vermin; these tubs should be emptied after they have bathed, as they should not be allowed to drink the water in which they have bathed.

DISEASE.

With good care, properly-constructed houses, wholesome food, never sour or tainted, very little disease should be encountered.

Prevention is better and more easily administered than cure; some of these are dry houses, pure water, regularity in feeding and cleanliness.

The water buckets should be washed out frequently, and especially in hot weather, with creolin water, made by adding one teaspoonful of creolin to one quart of water. This will kill any disease germs that may be present, and is a good disinfectant.

A few drops of laudanum may be put in the drinking water once or twice a week, and occasionally a few drops of nux vomica; this will keep the birds healthy.

If, however, a sick bird is noticed, it should be removed from the flock at once and the rest closely watched and all precautions taken to disinfect. At moulting time some birds have difficulty

in getting rid of their large tail pinions, and they are noticed to droop and cease to feed, and may become sick and even die, by going light, as it is called by pigeon growers. These should be caught and the tail feathers pulled, which in most cases will prove effectual, if done in time. If not taken in time, the weak condition of the birds make them susceptible to other forms of disease, which may prove contagious in the end.

To sum up, first get good stock, preferably young birds, to begin with. Do not buy old lofts of birds that someone is tired of. Secondly, use the pure stock and their crosses, and never the common birds. Thirdly, the straight Homer is the best all-round bird for squab raising, the best cross being with the white German Homer. Fourthly, the Dragoon cross is as good, but takes one week longer to grow the squab. Fifthly, give good care, not neglecting the small things, as it is in the multitude of these wherein the profit lies. Sixthly, the demand for squabs is constantly increasing, and anyone entering into this branch of business and willing to give it the attention it requires, will always find a profit on the right side of the ledger.

But remember, this profit will be according to the care and intelligence put into the business.

Useful Birds on the Farm,

How to Attract and Protect Them.

BY EDWARD HOWE FORBUSH, ORNITHOLOGIST MASSACHUSETTS
STATE BOARD OF AGRICULTURE, WAREHAM, MASS.

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Useful Birds on the Farm, How to Attract and Protect Them.

BY EDWARD HOWE FORBUSH.

For more than a century there has been going on in this country a tremendous slaughter of wild birds. Species have been exterminated. Others have been brought to the verge of extinction.

The treatment they have received at our hands has been worse than that accorded the American Indian or the rattlesnake. They have been shot, snared, netted, scalped and burned alive. They have been roasted, stewed and made into pies by the people who should have been their best friends and protectors.

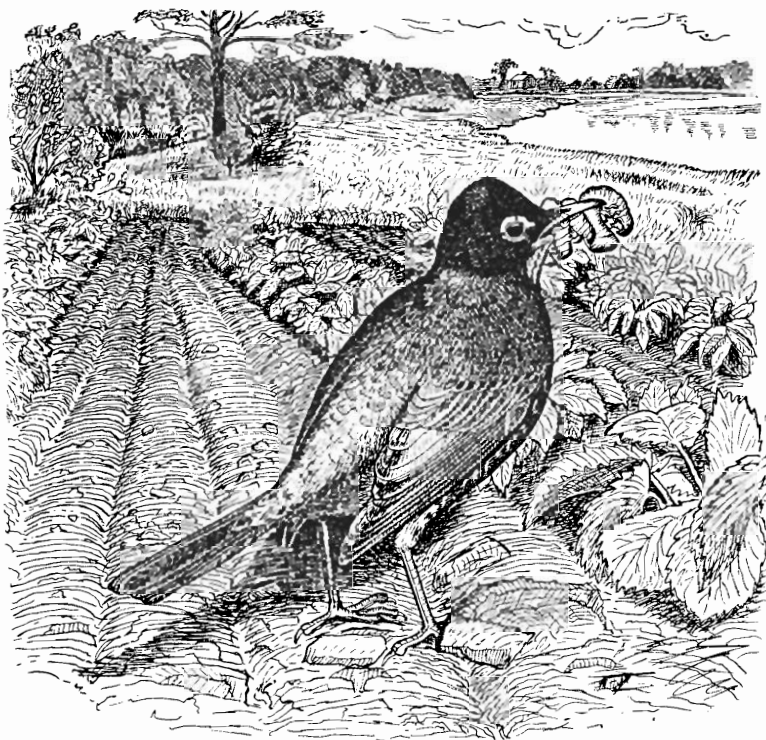
The assertions that birds have been scalped and burned alive may need some explanation, but the facts will bear out the statements. Millions of herons and egrets have been shot in southern swamps, the skin and plumes torn from bleeding heads, backs or breasts and the young left to starve in the nests, that the bonnets of our fair ones might be decorated.

Thousands of gulls and terns have been shot down and their wings cut or torn off, while in some cases they were still living, in the haste of the hunter to reap his share of the golden harvest provided by the votaries of fashion.

Vessels have been manned and sent in search of plumes. The services of half savage Indians and negroes have been enlisted, and the misery, suffering and slaughter inflicted on the birds have been beyond description. Still fashion decrees that feathers must be worn, and when our supply of fashionable birds is exhausted, the southern continents and islands are ransacked, while beauty calmly wears the rifled plumes—the badge of blood and shame!

Thousands of young birds are burned alive by fires set in dry seasons by boys in the woods. Market men make special arrangements with hunters or send out netters and sweep the quail or plover from whole States.

Notwithstanding the barbarous and terrible treatment the birds have received at our hands, the survivors bravely return



Robin with white grubs taken from the strawberry bed.

year after year to their old homes and endeavor there to build their nests and rear their young.

Shall we not bid them welcome? Shall we not as farmers endeavor to contribute something toward their comfort and well-being in return for the good they do? Let us consider their claims to our protection.

Birds are useful (1) as scavengers, (2) as gatherers of plant food from the sea, (3) as distributors of the seeds of useful trees

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and plants, (4) as destroyers of weed seeds, injurious insects, mice and other injurious mammals.

In studying, at present, the birds of the farm, our consideration of the water birds must be very brief, for they are so persecuted along our coasts and rivers that they are usually driven far away from cultivated lands. In some counties of England, and in some of our own western States, gulls still follow the plow, picking up grubs and worms. Here they are shot at sight and, being obliged to keep aloof from human habitations, they have little chance to acquire such useful habits. Fortunate are they, indeed, if they escape with their lives and are allowed to breed upon some desert island. We should not forget that sea birds have contributed largely to the fertility of our farms. For ages they have accumulated guano on islands of the sea, furnishing the world's supply of this valuable fertilizer.

The sea birds breeding along the Atlantic coast have been recently very near extermination. They have been saved from this threatened extinction, however, by a determined body of men, the "Committee on Bird Protection," appointed by the American Ornithologists Union, under the leadership of William Dutcher, of New York. The remaining birds are now protected on their breeding grounds.

A very efficient officer of the United States Biological Survey, Dr. T. S. Palmer, is enforcing the laws enacted against the use of plumage of birds by milliners, and the work of the Audubon Societies among the women of the country admirably supplements his efforts.

The shore birds are still in danger of extinction owing to the greed of the marketmen. That useful bird, the upland plover, or Bartramian sandpiper (*Bartramia Longicauda*), is now rare in the East and almost exterminated in large sections of the West; but the United States Department of Agriculture is engaged in securing the enforcement of the laws in regard to these birds. So we may safely leave them in good hands and turn to the birds that are still found on the farm.

Not the least among the many benefits which some of us, as farmers, derive from birds, is the pleasure we take in watching their interesting habits and listening to their cheery songs. An

enthusiastic friend says that he will gladly furnish the robins with all the fruit they want. "For," says he, "the first robin that sings to me from the top of my maple tree in spring pays his board then and there for the season." But the more practical among us wish to know whether the bird really pays its board in material services before accepting it as a friend and offering it hospitality and protection. The answer to this query depends mainly on the nature of its food.

Birds are remarkably active and energetic creatures, requiring a tremendous amount of food to sustain them in their efforts and to repair the waste of the tissues.

Some of the smaller birds require only half an hour to an hour and one-half to completely digest a full meal, and the stomach is filled many times each day. The rapidly-growing young need far more food in proportion to their size than the old birds. An adult crow will eat about eight ounces of food daily. A young crow nearly fledged requires at least ten ounces.

Professor Treadwell found that a young robin needed one-half its own weight in solid beef or 48 per cent. more than its own weight in worms daily, to secure its healthy growth and development. It is now well known that to these remarkable appetites we owe the repression of many of our insect enemies. The smaller land birds feed largely upon insects. Where insects are numerous birds eat them with almost incredible rapidity. My assistant, Mr. F. H. Mosher, saw a pair of tanagers eat thirty-five newly-hatched caterpillars in a minute. They continued eating these minute insects at this rate for eighteen minutes; so that, if Mr. Mosher's count is correct, they must have eaten, in this short time, six hundred and thirty of the little creatures. This would not make them a full meal, as the entire number would hardly be equal in bulk to one full grown caterpillar.

By carefully watching two Maryland yellow-throats and counting the plant-lice they ate, he estimated that they destroyed seven thousand within an hour,—a thing almost incredible, but still possible, when we consider the exceedingly small size of the insects at the time, their swarming numbers, the activity of this warbler and its remarkably rapid digestion. Dr. Judd speaks of a letter received from Mr. Robert H. Coleman, in which he

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says of a palm warbler, that it must have killed nine thousand five hundred insects in about four hours. These may be extreme cases, but even if we halve the numbers given, they will still serve to show the bird's possibilities for good.

The remarkable appetites of the young birds keep their parents very busy. The old birds usually carry to the young from one to twelve insects at each visit to the nest, although some visits are made for other purposes. A pair of vireos visited the nest one hundred and twenty-five times in ten hours. A pair of chippies made nearly two hundred visits to their young in a day. Martins have been seen to visit their young three hundred and twelve times in fourteen hours. Rose-breasted grosbeaks made four hundred and thirty-six calls at the nest in eleven hours. House wrens have been seen to enter the nest from thirty to seventy-one times an hour.

In view of these facts we may, in time, come to give credit to the statement of Professor Wood that the daily food of a robin is equal in bulk to an earth worm fourteen feet in length. He tells us that were a man possessed of proportionate food capacity he could consume each day sixty-seven feet of a sausage nine inches in circumference.

In studying the effects produced upon our farms by maintaining upon each of them some scores of these wandering insatiable bird appetites, we will first consider

THE BIRDS OF THE WOOD LOT.

Chapman, in his recent work, "The Economic Value of Birds to the State," says, "Between the birds and the forest there exist what may be termed primeval economic relations. Certain forest trees have their natural insect foes, to which they furnish food and shelter; and these insects, in turn, have their natural enemies among the birds to which the trees also give a home.

"Here, then, we have an undisturbed set of economic relations: (1) the tree; (2) the insect which lives in the tree, preys upon it, and may assist in the fertilization of its blossoms; (3) the bird, which also finds a home in the tree and, feeding upon insects,

prevents their undue increase." We can readily see that the trees are essential to the birds both as a shelter and a source of food supply, while the birds are necessary to the tree, as they prevent the insects which infest it from becoming so numerous as to destroy it.

It may be that the birds are also necessary to the insects which, were they not held in check by birds, might destroy the trees and then starve. Through the ages there has become established a balance of forces, most delicately adjusted, between the tree, the bird, the insect and all the conditions of their surroundings.

The more trees there are the more insects can live upon them, and hence the more food is provided for birds. Birds, having need of trees, are therefore made the vehicles for their propagation and distribution. Birds are very fond of wild cherries. The fruit is often eaten whole, and the stones or pits, afterward ejected, are scattered over the country by birds in their flight, or left along walls or fences, where they perch, or in the woods where they roost. In uncultivated lands many of these pits sprout, and the sprouts take root and grow. Thus the country is planted with wild cherries. Were they not furnished with wings by birds or carried about by mice or squirrels, they must all fall under the trees on which they grew, where most of the young sprouts would soon perish.

The character of the wood lot is largely determined by these creatures. Squirrels, jays and crows carry nuts and acorns into the pine woods and bury them there. If we cut off a pine wood, hard-wood saplings spring up to take the place of the pine. Birds and squirrels have planted the seed, and the removal of the old pines lets in the light and starts a new growth. Thus hard-wood trees succeed the pine. When the pines are cut off jays and crows desert the place; but, as the young growth starts, other birds come in.

The towhee (*Pipilo Erythrophthalmus*), brown thrasher (*Toxostoma rufum*) and field sparrow (*Spizella pusilla*), which find their food largely on or near the ground, now frequent the lot. As the trees grow larger, cuckoos, vireos and warblers (birds which feed largely on caterpillars), begin to come in, followed a little later by tanagers, grosbeaks, thrushes and other

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wood birds. The wood insects are a mighty host. The oaks alone are infested by about eight hundred species. Among these there are many which, if allowed to increase unmolested, would destroy the trees.

Now mark this provision of Nature! Certain birds are fitted to prey on insects of certain habits, so that birds form an almost perfect protection to the tree. First, the woodpeckers, tunneling into trunk, branch and twig, draw forth ants and borers which destroy the wood and bark. Next, the titmice, creepers, nut-hatches, and kinglets search the crevices in the bark and the surface of both twigs and buds for the eggs and pupæ of insects hidden on the under sides of branches, in holes and crevices, or under loosened bark. They eat aphides, scales, small beetles and other bark insects, as well as caterpillars and other creeping things.

The warblers, wrens, vireos, thrushes, tanagers, cuckoos and jays search out the maggots and caterpillars in the buds or upon the leaves. When some of these luckless larvæ seek to escape and, spinning down by silken threads, hang suspended in midair, they are caught by the flycatchers. If they drop to the ground they become the prey of sparrows, thrushes, ovenbirds, towhees, grouse or other ground-feeding birds.

When those that escape all these enemies assume the perfect form and, as beetles, butterflies, moths, flies, winged ants, or other imagoes attempt to escape by flight, they are pursued by flycatching warblers, flycatchers, cedar birds, swallows, whip-poor-wills, hawks and owls. Should they escape all these and reach the upper air, there are still martins, swifts and night-hawks to pursue them.

Thus the birds establish a wide zone of protection about the trees and, working in conjunction with the other enemies of insects, save the wood lot from insect devastation. The hares, rabbits and mice which gnaw and kill the young trees are eaten by hawks and owls that find homes in the woods.

The ruffed grouse, partridge or pheasant (*Bonasa umbellus*) is everywhere a useful bird in the woods. If these birds were properly protected they might be much more numerous than they now are. They can maintain themselves anywhere, living in

winter on wild berries dried on the stem, buds, leaves, and even broken twigs. They are as much at home beneath the snow as above it; seeming perfectly comfortable in winter storms when the snow drifts over and buries them.

This bird's protective coloring makes extremely difficult the discovery of the nest by its enemies. The bird seems to know this. I have had large gangs of men cutting and burning brush, working all about a grouse's nest while the bird remained sitting motionless on her eggs. I have noticed that where the enemies of birds were destroying nearly all the eggs or young of the tree-breeding birds, many ground-breeding species escaped. This is due in part to the manner in which the nests of some ground-nesting birds are hidden and, in part, to the blending of the colors of the sitting birds with dry leaves and other surrounding objects. Thus they escape the far-seeing eyes of crow and hawk; but how do they escape the sharp noses of the fox, skunk, mink and weasel? Why cannot a fox discover every nest of a ground-breeding bird in the wood lot by merely quartering over it against the wind?

Where grouse are protected, they hatch and raise large broods notwithstanding the presence of predaceous animals. To do this successfully they must leave no scent. Dr. C. F. Hodge, of Clark University, tried skillful, well-trained pointer and setter dogs, and they could not discover a sitting grouse on her nest, nor could one of them find her after she had left the nest, walked about, and returned to it. How such a thing can be possible is yet one of Nature's mysteries. Probably few predaceous animals ever find the nests of these birds, except as they stumble upon them when hunting.

During the past season I had many opportunities, while on the estate of Mr. William Brewster, at Concord, Mass., to watch young grouse feeding. They feed much like young chickens, and seem to take only insects if they can find them. It is remarkable how soon they learn to do this and how thoroughly each brood works over the ground, finding insects on the ground and as high up on the plants as they can reach or jump.

When they learn to fly they will also get up on low bushes, and even into trees, when still no larger than small chickens. They

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eat many caterpillars and the larvæ of beetles; but, if there is grass land near their home, they may get into the fields occasionally, where, like young chickens or turkeys, they eat grasshoppers. The grouse does very little harm, and is so useful in the woods that it should never be shot for the market.

The sale of these birds in the market is not now allowed in Massachusetts.

The nighthawk (*Chordeiles virginianus*) is a harmless bird, and should never be shot in New Jersey.



Mosquito.
Eaten by the Night Hawk.

It is known to eat quantities of mosquitoes, and that should be enough to recommend it to a Jerseyman.

With this brief glance at the wood birds and their work we must pass to

THE BIRDS OF THE ORCHARD.

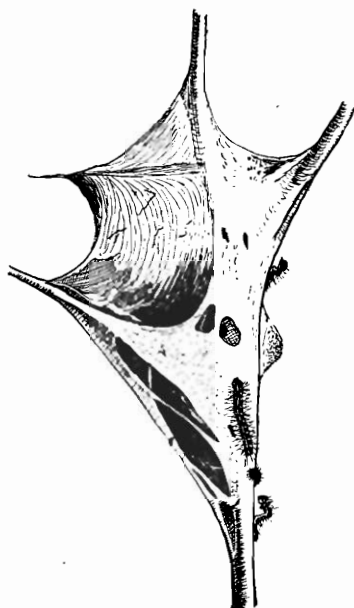
The conditions in the orchard approximate those in the wood lot. The trees offer some shelter to birds and some security from such of their enemies as cannot climb or fly. Most of the older trees are much decayed as a result of neglect or bad pruning. The dead and hollow limbs and trunks furnish nesting places to such birds as once bred in the decaying trees of the woods. The trees of the orchard also provide an abundance of insect food. They are usually planted in or near fields and gardens where many species of insects can find food and shelter. For these reasons orchards are much frequented by birds.

In 1894 I made an experiment in Medford, Mass., to test the usefulness of birds in an orchard. The winter birds were attracted to the orchard by fastening small pieces of waste-beef fat, suet and bones in the trees. Later, bird boxes were put up, and some effort was made to render the orchard attractive to birds.

Late in the fall countless numbers of the wingless females of the fall canker-worm moth (*Anisopteryx pometaria*) were seen crawling up the trees. Most of these were eaten by the chickadees, though some doubtless fell victims to the nuthatches. The chickadees ate also the eggs of these moths as well as the imagoes

and eggs of the spring canker-worm moths (*Paleacrita vernata*), which swarmed on the trees in early spring.

As spring opened, nesting material was hung upon the trees to attract breeding birds, and thirty-six pairs of birds nested about the orchard. Most of them were unable to raise their broods because of persecution by both man and the lower animals; but they cleared the trees of the remaining canker-worms and tent caterpillars, so that my orchard and the one next it remained in full



Web of Tent Caterpillar, broken open by Birds.

foliage and bore well. No apples were raised elsewhere in the neighborhood that season and very few in the town, as nearly all the trees were stripped of their foliage by cankerworms and other caterpillars. The happy result in my orchard was due largely to the chickadees. These birds are harmless. They are probably the best feathered friends of the orchardist.

They feed upon the eggs of the tent caterpillar moth (*Clisiocampa americana*), upon plant lice and their eggs, bark beetles, scales, tineids, bud worms and many other enemies of trees that



Young chickadees reared in a bird-box on the author's house.



"Birds' Christmas tree" and feeding-shelf put up at a window of the author's house. (A chickadee is seen feeding on lowest branch.)

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live or hibernate upon or near the surface of the bark. They are strong enough to take small borers from out the rotting wood and evince some skill in finding them. They are destructive to the pupæ of the codling moth (*Carpocapsa pomonella*). It seems as if we could not have too many chickadees.

My assistant, Mr. C. E. Bailey, who examined the stomach contents of many chickadees and watched their feeding habits one winter, estimated that when cankerworm moths are abundant each chickadee feeding upon them must destroy at least 138,750 of their eggs in 25 days. This the birds accomplish by eating the egg-bearing females. As they also eat the eggs after they are deposited, their value in respect to this one insect is plain. They are also destructive to hairy caterpillars, which many birds eat rarely, and some apparently do not eat at all. New Jersey is fortunate in having three species of titmice or chickadees (*Paridæ*) within her borders. Time allows only the merest mention of other valuable orchard birds. Such are the robin (*Merula migratoria*), blue bird (*Sialia sialis*), downy woodpecker (*Dryobates pubescens medianus*), both nuthatches (*Sitta carolinensis* and *S. canadensis*), both cuckoos (*Coccyzus americanus* and *C. erythrophthalmus*), the Baltimore oriole (*Icterus galbula*) and the chipping sparrow (*Spizella socialis*).

We next pass to

THE BIRDS OF THE FIELD.

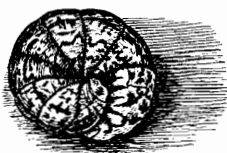
In the grass field, as in the orchard, natural conditions are simulated. Each year, until haying time, the grass offers a cover for the nests of such birds as inhabit natural prairies, meadows, or savannas. It also furnishes food for birds and food for the insects on which birds feed.

As in wood and orchard, there is a natural interdependence between the grass, the bird and the insect. Birds of the orchard and woodland, flying to the field for food, assist the ground birds in holding insects in check. Particularly useful in this respect are the robin and the crow (*Corvus americanus*).

It should be said in passing that this service is reciprocated to the woodland and orchard by such birds as the red-winged blackbird (*Agelaius phœniceus*) and the bobolink (*Dolichonyx oryzivorus*), which often feed on caterpillars gathered from the trees. In the upland fields, ground-nesting sparrows predominate. In lowlands, meadows and swamps, bobolinks, blackbirds and meadowlarks dwell.

All these birds are exceedingly serviceable in the fields and meadows, though the blackbirds and bobolinks sometimes make havoc in the grain fields.

The much persecuted meadowlark (*Sturnella magna*) is one of the most beneficial birds of the field and is almost entirely



Cutworm.
Eaten by Robins, Meadow
Larks and Sparrows.

harmless. This bird, a great feeder on grasshoppers and cutworms, spends most of the summer hunting for insects and in winter feeds largely on weed seeds; but it has been pursued by gunners and marketed under the name of marsh quail or some similar misnomer until the species has become both scarce and wild in many regions.

The many field sparrows such as the grasshopper sparrow (*Coturniculus savannarum passerinus*), the savanna sparrow (*Passerculus sandwichensis savanna*) and the vesper sparrow (*Pœcetes gramineus*) are all essential to the welfare of the fields while they remain with us, as they feed very largely on grass-eating insects and weed seeds.

The flicker (*Colaptes auratus luteus*), our largest common woodpecker, is much in fields, where it feeds on ants, leaving its more strictly arboreal cogeners to delve laboriously into the trees for the wood-boring species.

The mourning dove (*Zenaidura macroura*) is a useful seed-eater and the bob-white deserves mention here, but will be considered more fully as a garden bird.

The few plovers and sandpipers still left from the annual slaughter might be of great service could they be protected and their numbers increased, as they are nearly all grasshopper hunters. We may now turn to those birds not least in importance:

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THE BIRDS OF THE GARDEN.

When, in the settling of a new country, we undertake to raise crops or to make a garden, we must first clear the land. By cutting trees and uprooting stumps and underbrush we remove the natural shelter and nesting places for birds and, to some extent, destroy their food. Some woodland insects may persist and later attack young orchards or growing crops; but the birds which formerly lived in the woods are driven away.

If the land intended for our garden is natural meadow or prairie, we must dispose of the grass, and so the sod is turned under. As in the woodland, both the shelter and nesting places of the birds are destroyed, together with most of their food. Such insects as hibernate in the ground, like the white grubs and cutworms, may survive and eventually come to live on the fruits of our labors; but the birds are driven out.

In making a garden we desire to prevent ragweed, chickweed and other weeds growing, that we may raise the corn weed, bean weed and other useful plants to a state of abnormal cultivated perfection.

Usually there is no nesting place in the garden for tree-breeding birds, and the operations of tillage, hoeing and weeding make nesting unsafe and impracticable for the ground birds. Birds, at first, used to nest in the garden. In my boyhood, sparrows frequently built their nests in the potato hills and sandpipers raised their young in the corn fields; but the cultivator and hoe drove them away. Now birds rarely breed in cultivated fields or gardens, except where trees, bushes or vines furnish them nesting places. The farmer prefers to keep trees out of the garden as they interfere with the cultivation of other plants and so the birds are kept out.

On the other hand the garden is a paradise for insects. Here they find the most succulent food plants, finely developed, and grown in patches or masses, often by the acre. Abundant opportunity is thus offered for the increase and spread of insects which confine themselves to a few food plants. Insects leave the wild plants on which they formerly fed and gather to the feast in the garden.

Now, if a bird, coming into the garden, takes a few peas, strawberries, cherries, or a little corn we get out a gun; all services the bird has rendered or may render being lost sight of in view of the fact that it has taken some of the fruits of man's labors.

Partly for the foregoing reasons and partly because some of the most important garden pests are eaten by few, if any, birds, we get less assistance from birds in our gardens than in woodland, orchard or field.

Certain garden insects are furnished with vile secretions and are probably distasteful, if not injurious, to birds. The common squash-bug (*Anasa tristis*) is a familiar example. It is said that the toad cannot safely eat more than three of these repulsive insects. Dr. Hodge fed a potato beetle to a young blue bird. The bird soon died. The chinch bug and Colorado potato beetle are probably eaten by but few birds.

It seems hardly necessary to point out the fact that it is of the utmost importance to farmers and gardeners that the few birds that have become adapted to the artificial conditions of the garden and help us to protect our crops from insect enemies, be jealously guarded and conserved so that their numbers may increase and they may continue their good offices fearlessly and in the full confidence inspired by human protection.

I now believe that the robin is not only useful in field and orchard, but is the most useful of all birds in the garden and so abundantly merits our protection and care.

It will be necessary here to digress briefly in order to show that I have had opportunity for studying the bird in an economic way.

I had been studying the food habits of birds for twenty years when, in 1900, I concluded that before attempting to instruct the farmers on this subject, I ought to become a farmer myself, that I might be able to look at certain questions connected with economic ornithology from the standpoints of both ornithologist and farmer.

My experience on the farm has led me to believe that it would greatly advance the cause of agriculture if every man, whether college professor, writer or lecturer, who undertakes to teach the farmer about farming could be obliged to buy, settle upon, and

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make a living for a series of years out of a farm. Such an experience would bring the teacher much nearer the farmer.

It would give him an insight into the struggles and toils of a farmer's life and his limitations in regard to working capital and ready money. It would give him a deeper sympathy with the unfortunate and unsuccessful brother and a wholesome respect for the successful man who, overcoming all obstacles and despite all limitations, succeeds in improving his farm and "wringing a competence from the unwilling soil." The man who has been obliged to depend upon the farm for the subsistence of himself and family will be careful how he advises the farmer to spend his hard-earned dollars.

I had worked upon farms in my boyhood, but never afterward had I time or opportunity to operate one until 1900, when I purchased a small place in Wareham, Mass., at the head of Buzzard's Bay. There I have been farming, fruit-growing and market-gardening, in a small way for three years.

I had previously made studies of the food of orchard and wood birds, but there I have had a chance to study in a practical way the birds of field and garden and their relations to the farmer. The place is situated on the Agawam river and fronts on tide-water. The country about is well wooded and watered, with an abundance of wild fruit and is in many ways an attractive region for birds. It is also in the track of many migratory land and water birds.

Robins are remarkably abundant in this vicinity. They are by far the most common bird. Hence their influence for good or ill must be considerable. South of the house is a grove of white pines more than forty years old and about six acres in extent, with a small spring-fed pond near its southern border. This grove makes an ideal roosting place for robins, while the pond furnishes them drinking and bathing facilities. Here hundreds roost in the spring and thousands in the fall. In 1901 there were more than thirty robins' nests within a radius of ten rods from my house. So, you see, we have more than our share of robins.

In 1901 we had a small strawberry bed. The robins, squirrels and cat birds got all the fruit. Naturally the robins were blamed

for all. This created, as it usually does, an unreasonable prejudice against the birds, which I fully shared. The usual cry went up: "Shoot the robins and spare not for too great is their reward."

Not wishing to do anything hasty or foolish, I made a careful study of the food of the robins in the garden and found that they were eating five caterpillars, beetles or grubs, for each strawberry taken. I concluded that they were paying more than the market price for those berries.. The next year we had a larger bed and all the fruit we could use although the robins had their share.

The robin delights in a well-cultivated garden. The farmer who diligently cultivates his land will have little reason to find fault with the robin. Where the soil is kept stirred the robin is most useful. To such land they resort constantly, in search of grubs, cutworms and wireworms. Intense cultivation so loosens the earth that the robin can readily get at these insects.



Wireworm.
Eaten by the Robin.

We cultivated our garden well and the robins gleaned close after. We kept no dogs or cats to frighten or annoy them and they soon became so confiding that they would come and take worms or grubs that were tossed to them. I have seen a robin dig out three large white grubs and finally take them up all at once in her bill, fly to the nest, feed them to the young and come back immediately for more.

At the upper end of the garden there was a bed of beets and carrots. As the season advanced, this ground was found to be literally swarming with white grubs and we concluded that there would be little profit in raising carrots. Soon it was noticed that something had dug many holes among the plants. We found by watching that the robins did this to get at the grubs. They continued this work through the season, and so thorough were they that scarcely a root was materially injured by the grubs, and a bed of strawberries set out the next season on the same ground was very little harmed.

Part of the credit of this good work should be given to the despised moles that tunneled under the carrot rows and, no doubt, took some grubs that the robins could not get at.

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The robins, like some other birds of the thrush family, seem able to find their prey in the dusk of early morning and at evening, after most birds have gone to rest. Therefore they are best fitted to find cutworms, which are out at evening and at early morning. The robin is also destructive to caterpillars, grasshoppers, crickets, wireworms and many of the farmers' foes.

It eats no grain, and where no small fruits are grown it may be regarded as an unmixed blessing. In Massachusetts, where we have plenty of wild fruit, the adult birds do not appear to feed very largely on cultivated fruit. The young, while in the nest, are fed almost entirely upon insects, but afterwards they eat considerable quantities of fruit. With us they did not feed much on currants, raspberries or blackberries; but in some localities they do some harm in this way. Still, large fruit growers inform me that they notice little injury from the robin.

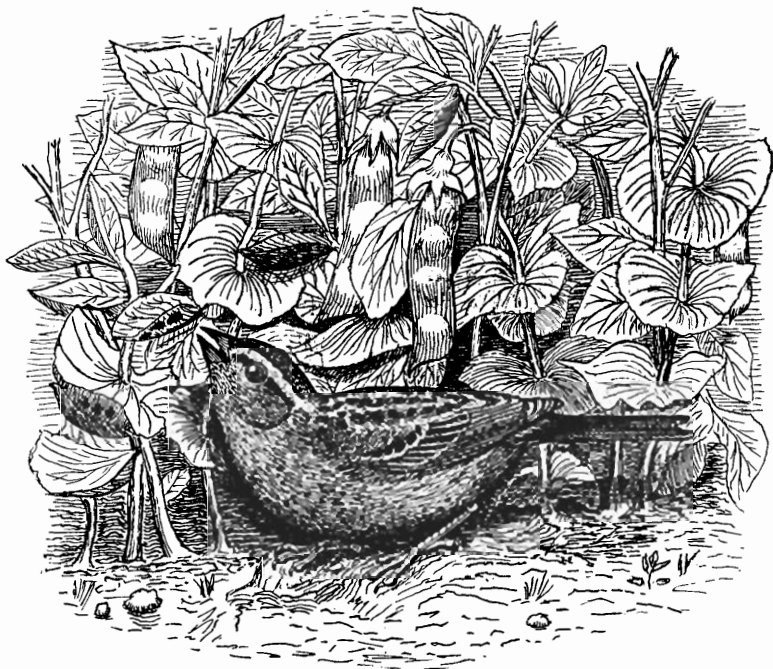
It is the man who lives near the city, where there is little wild fruit, and who has one or two pet early cherry trees and a little strawberry bed, who suffers most in proportion from the robin. In my experience the squirrels and catbirds are the most pernicious strawberry pests. Where robins greatly injure the cherry crop, they may be drawn off by planting mulberry trees, which fruit as early as the cherries. They seem to prefer mulberries to cherries. Mr. F. M. Chapman suggests that, in the meantime, the birds may be driven away by firing powder charges among them.

Where robins are very numerous and there is no wild fruit, they may become a nuisance to the fruit grower. In such a case the complaints of the fruit grower should not be ignored. The bird is regarded as the property of the State. Let the State, then, compensate the fruit grower for the injury done his crops by those birds that the law protects. The robin deserves protection as one of the farmer's best friends.

Next to the robin, the most useful birds in my garden were the chipping sparrow (*Spizella socialis*) and the song sparrow (*Melospiza cinerea melodia*). These birds are known commonly among our farmers as the chip bird or chippy and the ground bird. The chipping sparrow eats the pea louse, the beet worm and insects which infest parsnips, turnips, cabbages, celery and other low-

growing crops. It eats not only smooth caterpillars, like the cabbage worm, but also hairy caterpillars of several species. The song sparrows spent much of their time among the cabbages, which they kept quite free from lice and worms. Sparrows of different species destroy great quantities of weed seeds in neglected gardens and fields.

Dr. Judd, of the Biological Survey, United States Department of Agriculture, has given a most convincing account of the value



Chipping Sparrow eating pea lice.

of sparrows to agriculture. He says their chief service to the farmer is that of destroying weed seeds. Professor Beal estimates that the tree sparrows in the State of Iowa destroy 875 tons of weed seeds each year.

In passing I cannot forbear to speak in praise of the excellent work that has been done by Dr. Merriam, Professor Beal, Dr. Judd and Dr. Fisher, in studying the food of North American birds and publishing the results. It is a task of great magnitude,

and the results thus far published far exceed those of any similar effort ever made. Every farmer should secure these publications.

The house wren (*Troglodytes ædon*) is a most useful bird in the garden. It has been driven away from many localities by the English sparrow, but may sometimes be induced to remain and breed by putting up nesting boxes with a round entrance hole about an inch in diameter. These the wren can enter; but the sparrow can not.

Dr. Harris tells us that the Baltimore oriole splits open green pea-pods to get at the weevil grubs which infest the peas. This may explain the complaints against the oriole, which has sometimes been regarded as destructive to green peas.

Blue birds, swallows and martins capture flying insects about the garden. Mr. John L. Russell, of Salem, Mass., tells of the finding of a quart of the wing cases of the striped cucumber beetle in a martin box. Kingbirds and phœbes are also useful in this respect, and the kingbird will keep hawks and crows away.

Among the most valuable birds to the farmer and gardener is the bob-white (*Colinus virginianus*), called quail in the North and partridge in the South. This bird should never be killed for the market, but should be guarded and preserved by every means in our power. It eats very little grain, except what it finds on the ground, and it only occasionally eats cultivated fruit. This bird and the rose-breasted grosbeak are the two species which have been most generally observed to feed on the Colorado potato beetle (*Doryphora 10—lineata*). Let a farmer once become convinced of the value of this bird, and he will voluntarily protect it.

Mr. H. W. Tinkham, of Touisset, Mass., writes me: "I have been a gunner all my life, but am converted now, and the man who shoots a quail on my farm has to fight me. Both my sons and myself have frequently seen quails eating potato bugs this summer." He says further that from his observation of the quail's habits he believes they are worth five dollars each to him alive on his farm.

When unmolested, the bob-whites feed mostly in fields and gardens, living very largely on many of the greatest farm pests. They destroy the chinch bug (*Blissus leucopterus*), the army worm (*Leucania unipuncta* and other species), the cotton worm

(*Aletia argilacea*) white grubs, wireworms, cutworms, grasshoppers and locusts. These are among the most destructive insects known, and have caused losses of hundreds of millions of dollars to the farmers of this country. Still the poor birds are pursued until they are so nearly exterminated that their pursuit is no longer profitable.

While I fully appreciate the value of this bird to the sportsman and epicure, I believe its value to the farmer is far greater than the few cents which its carcass may bring him. It is poor policy for the farmer to shoot or trap this bird or allow it to be shot or trapped on his land when he can prevent it. Were it not for the interest taken in the bird by the sportsman, it would have been practically exterminated long ago through the greed of the marketmen and the farmers, who have joined hands in the attempt to sweep the country bare of the species.

It is shameful, if true, that to preserve our game birds we must rely on the sportsmen who wish to preserve birds only that they may have more birds to shoot, while the farmer, who should be most vitally interested, merely joins with the marketman in the work of extermination.

HOW TO ATTRACT AND PROTECT BIRDS.

We can readily attract birds about our farms and gardens by supplying food to them. If the farm and its surroundings are furnished with a great diversity of trees and shrubbery, birds will find their natural food in the insects, wild fruit and seeds which Nature bountifully supplies. Such a farm will prove naturally attractive to birds, especially if it is well watered.

But we can do much even where natural conditions are not so favorable. At my home we always plant sunflowers, which bring the goldfinches, and Japanese barnyard millet, which attracts all kinds of sparrows. In winter the mountain ash, red cedar, bayberry and waxberry myrtle all furnish fruit which attracts birds. Bones, suet or waste meat, hung on the trees in fall or winter, bring jays, chickadees, woodpeckers and nuthatches. Thickets of bushes and evergreen trees serve to protect birds from inclement weather and their enemies of the air.

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Cooper hawks and sharp-shinned hawks, cats, English sparrows, nest-robbing jays, crows, squirrels, snakes, mice and other mischievous animals must be shot or trapped. Boys must be taught to love and protect birds. I know of no surer way to secure the protection of birds than to interest the children in their behalf. At my home, feeding the birds has become a daily duty of our life on the farm in winter. Shelves are put up outside the windows, and branches are fastened upon them, to which food is attached, while the shelves are strewn with millet seed and with crumbs from the table. Hay-seed from the barn floor will also do quite well.

While the family sits at meals the birds also are eating just outside the window pane. It is not unusual at the noonday meal to see a dozen or twenty birds of several species about our windows. Even the jays and crows are not forgotten in winter, when they do no harm, and so they come close to the house to feed.

We also put up nesting boxes for the birds. Children who begin by feeding birds and putting up nesting boxes for them do not end by shooting them or destroying their eggs.

Birds are very susceptible to kindness, and may often be taught to come at call and to take food from the hand. They can be almost domesticated in this way. Experiments of this kind are especially interesting to ladies and children. They serve to vary the monotony of farm life and lend a new interest to the coming of the seasons. A lady wrote me not long since that she and her sister, as children, once tamed a chippy so that it would take food from their hands. The bird was marked so that it was recognizable, and she graphically described the delight they experienced the following spring, when the little bird returned from the South and again came to their hands for food. One learns to regard such birds as old friends, and look with longing for their coming.

I want to urge farmers to interest the children in attracting birds about the homestead and protecting them from their enemies. If this were done, there would soon be no need of societies for bird protection or the prevention of cruelty to animals. The child who has put out a "Christmas tree" for the birds and seen

them come to partake of his bounty, or has put up a bird house and watched the nest-building and the rearing of the little ones, will ever afterwards exhibit a tenderness toward these harmless creatures.

In watching the birds and studying their habits, the observational faculties of the child are early developed, and a healthy interest is awakened in animated nature, which will tend to increase the enjoyments of a country life.

In conclusion I will ask you to listen to a brief story of a bird house put up by two small children—the son and daughter of Professor Hodge. These children had become interested in watching the birds about the house. A pair of bluebirds having reared a family in a bird house near by, the children thought to have a bird house of their own.

About the beginning of the summer vacation they found an old bird box, nailed it, somewhat askew, upon a pole, dug a hole in the rough and stony ground, set up the pole and filled in the earth around it. This (to them) herculean task occupied the greater part of two days. A few days later they came in, greatly delighted, saying that a little bluebird was carrying straws into their bird house. So it proved. The nest was built. Four eggs were laid. Later four little naked birds appeared in that closely-guarded nest. Their rapid growth was watched with enthusiasm until, one day, there came a cold rain storm, chilling both birds and insects. The old birds being, perhaps, unable to find food for the young, disappeared, and were not seen much afterward. The young birds, being well fledged and lusty, were soon crying loudly for food. When Professor Hodge left the house it was still raining, and he carried an umbrella. As he passed down the sidewalk one of the young birds flew from the branch of a tree, passed under the umbrella and alighted on his arm. He carried the little one into the house; later another young bird flew to a window and was admitted. Professor Hodge went out in the rain and tried to feed the others mealworms, of which he had a good supply, but the youngsters were afraid of him and would not eat.

He then tried imitating the call of the old bird. Immediately the young ones sprang to the entrance hole eager and unafraid.

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They came to be fed, were taken into the house and installed with the others in a pasteboard shoe box. Here the children fed them for days, until at last when let out of doors one fine day, the spirit of freedom seemed to take possession of them, and they flew away to the tree tops.

There they staid all night; but the next morning they were calling loudly for food. When called by the usual whistle they all came down to be fed, and continued to come, at call, for about three weeks, learning, in the meantime, to find food for themselves. Finally they flew away to the South.

Professor Hodge, in the meantime, attached a small tag to a leg of each bird, so that if they return in the spring they can be recognized. What a wonderful and interesting experience this must have been to those children. Such experiences teach us how much better it is, for most purposes, to tame wild birds, while giving them their freedom, than to confine them in cages. It is not a very long or difficult task to teach some of the wild birds and animals to come and feed from our hands. By continued kindness we may gain their confidence. I have taught a chipmunk, in half an hour, to take food from my hand. A nut-hatch or chickadee may be tamed almost as readily. Robins and chipping sparrows may be taught to feed from the hand. Let us teach our children to be kind to the birds, that they may make companions and friends of these little creatures.

As years pass by, time and change are busy with our homes and our friends—all things are changing and passing away; but still the songs of the birds come to us, ever the same. As they were in the days of our youth, so we may hear them still. When the snow has gone you may hear again the spring song of the robin—the same song you used to hear at daybreak, when you lay as a child in your small bed up under the roof of the old farmhouse, where all night the watching stars shone through the chinks between the shingles.

As the days grow warmer we may hear the song of the brown thrasher at planting time—the same happy raillery we heard when as barefoot boys we dropped the corn and covered it with the hoe. Do you remember how he sang? Drop it! Drop it! Cover it up! Cover it up! What sound in nature would be more

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missed, were it forever stilled, than the rollicking, bubbling melody of the bobolink in the June meadows! What sound more sweetly solemn than the tones of the wood thrush heard in the evening shades!

Let us, then, teach our children to love and protect the birds, that these little friends of their youth may be here to cheer them with their songs when, toward the sunset of life, the shadows will lie long across the pathway.

The Chairman—Gentlemen, the discussion on this very interesting and valuable paper will be opened by Mr. Samuel N. Rhoads, of Philadelphia. I take pleasure in introducing Mr. Rhoads.

ADDRESS BY MR. SAMUEL N. RHOADS.

Mr. Chairman, ladies and gentlemen, I believe on the program I was announced to discuss the useful and injurious birds of New Jersey. I am very glad that one who is more competent than I to do it has performed the task so practically, because, with one exception, all the birds which Professor Forbush has so ably treated are represented in this State, under very similar conditions to those he has described; and I really feel that it would be best for me to only act as a sort of stool pigeon in the matter of what is to come after, which will be of more interest, as the discussion will be more generally on the topic which is mentioned in the program, in regard to robins. At the same time, I will make a few remarks in regard to the legislation which already exists on our statute books in regard to useful and injurious birds in the State of New Jersey.

It was quite a subject of interest to me to find the States of Connecticut and New Jersey were the first of the United States to pass protective legislation for birds other than game birds. This was in the year 1850,—an act entitled, "An Act to prevent the destruction of small and harmless birds." It reads: "that it shall not be lawful in this State for any person to shoot, or in any other manner to kill or destroy, except upon his own premises, any of the following description of birds: The night or

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mosquito hawk, chimney swallow, barn swallow, martin or swift, whippowil (sic), cuckoo, kingbird or bee martin, woodpecker, claipe or high hole, catbird, wren, bluebird, meadow lark, brown thrasher (sic), dove, firebird or summer redbird, hanging bird, ground robin or chewink, bobolink or ricebird, robin, snow or chipping bird, sparrow, Carolina lit (sic), warbler, bat, blackbird, blue jay, and the small owl."

I don't know whether the term "bat" there applies to the bull bat or night hawk, or whether it refers to the mammal, for it was thought, in 1850, when this act was passed, by some people that bats laid eggs. Then it goes on to give the penalties for breaking this first law. The law which is in force in this State now is much more complicated. I shall not read it all, but I might mention that pretty much all of our land birds—those not game birds—are protected by the law which is now in force, with the exception of the English sparrow, which is, of course, no affair of ours in one sense. "Black birds," which includes both the red wing black bird or starling, and the crow black bird, crows and hawks—other than the fish hawk—are not included among the birds protected by this act. There is no mention there of owls, but by implication, according to the version which is given by Dr. Palmer, of the United States Agricultural Department, owls are protected. There, however, they are not mentioned. Not such a bad thing, although some of you may think differently. Then there is a period or season when certain birds are exempted from protection—that is, people are allowed to shoot them as game birds—the dove, the flicker and the reed bird. This will give you something of a basis for discussion as to present conditions.

In regard to the law, rather than ramble over this subject in a wandering way, I have endeavored to curtail my remarks by writing out a few notes, so you will pardon me if I read a few small matters here which may have something to do with the discussion and also place my own attitude in regard to the subject of the legislation against birds before you.

"But, after all that has been said and done, what is an *injurious* or *noxious* bird? This term, which is so often used by the bird lover, the agriculturist, the scientist, and the legislator—was

there ever a phrase more in need of a definition? I know of but one species of noxious bird in this State. It is the English sparrow. Who can refute that statement? But where, I ask you, is there another New Jersey bird that you can put in the same class with this foreigner? I have you there! There are none. It is useless to conjure up dark memories of crows and blackbirds, hawks and owls, cherry birds and robins, and compare statistics with the huge and self-imposed mischiefs resulting from our importation of this pert little Mephistopheles into our Bird-Eden. Some of you will cry one thing, some another, at this my assertion, but every well-informed person knows well enough that our native birds are becoming scarce, or locally extinct, fast enough, without our lending a guilty hand in that process. When you have studied the life-history of all our outlawed or unprotected birds for ten years, every year and all year long all over this State, I can count you on my side—provided, however, you have no personal cornfields, nor favorite cherry tree, nor particular breed of spring chickens, nor a political constituency. I plead guilty to having been in all these trying situations at one time or another for twenty-five years. Just at present I am only a bookseller, and looking back on my bird experiences of the farm, the village, the city, at home, abroad, and in politics, my verdict is, Protect all our native New Jersey birds all the time all over the State. Give them the benefit of the doubt as to their utility; for remember, that not one of them has been branded as wholly injurious by even the most cold-blooded of our economists, and that *all* are included in the modern *protective* legislation of one or more of our States.

Crows and blackbirds have been proved by the most conservative students of economic zoölogy to at least balance their harmful food habits by their useful ones. Such a verdict is all-sufficient to acquit them. The same may be said of the hawks and owls, but as yet the standards of what is good and what is evil in the food list are so little understood that economic zoölogy may yet be said to only be in its infancy.

Pertinent to this phase of the question, I will conclude by reading some brief selections from articles I recently published in

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"Forest and Stream" and in the "American Naturalist." I hope you won't be bored.

In the "American Naturalist," under the term "Noxious" or "Beneficial"? "False Premises in Economic Zoölogy," I said:

"So many thousands of American dollars have been spent in the last ten years upon the investigations of the United States Department of Agriculture into the economic relations of plants and animals to man, and so much of inestimable value has been accomplished in this direction, that any criticism of the work turned out may seem captious, so greatly does the good outweigh the bad in the gross account. Nevertheless, there is always a disaffected portion of the agricultural classes who sneer at the study of 'bugs and bird stomachs' as a most unhappy and worthless waste of taxes. It is too true that the horse sense and field experience of some of these country folk often has a deeper and more practical wisdom in it than the professional zoölogist or botanist can gain in his laboratory work. Even the specialist in some of these studies would fain join in with the cry of the farmer, that all our efforts to regulate the ravages of noxious animals and plants are as likely to increase or transform the evil as to correct it. Under former conditions of ignorance there was abundant cause to advocate such a happy-go-lucky theory, but now, thanks be to the persevering efforts of true science and wise legislation, we must all agree that it is our duty to spend and be spent in these researches.

"It has been the writer's privilege to belong to both classes in this friendly controversy, and, with a fellow-feeling and sincere respect for each of these, he believes that the following remarks will be taken as evidence of his desire to reconcile, and not antagonize, the truth-seeking patrons and disciples of husbandry, whether in the field or the laboratory."

In "Forest and Stream," the sporting paper published in New York City, in 1898, I had the following remarks to make:

"In their simplest form some of the questions put to nature by the economic zoölogist of to-day are easily answered. Take, for instance, the status of certain insects popularly known as the potato bug, June bug and cutworm, which the veriest tyro in entomology or agriculture recognizes as an unmixed evil. But

when we consider the higher types of animal life in their relations to man's interests, the problem becomes more complicated. In many instances, as that of the crow, or of certain species of hawks and owls, or of such quadrupeds as the weasel, the mole and the jumping mouse, as well as in some species of reptiles, there is such an intimate blending of what we are pleased to call either 'noxious' or 'beneficial' that some are tempted to think it none of our business to interfere. Indeed, many honest people are convinced that our efforts to regulate economic conditions only increase the evil.

"Under the old regime of selfish ignorance there has been abundant cause for such a charge, but now, thanks to the persevering efforts of our scientific men, and the wise national and State legislation which has established our Departments of Economic Zoölogy in the United States, we can say most emphatically that it is our duty as well as our business to spend and be spent in this branch of research. This is evident not only from the utilitarian, but also from the æsthetic and altruistic standpoints. As a result of the enlightened study of the food-habits of our North American hawks and owls, we find that many, nay, the majority, of our birds of prey, outlawed and persecuted since Pilgrim times, have been our friends in every sense of the word. It is already difficult to believe that this verdict is largely the result of studies carried on in the United States during the last decade. But, as Dr. A. K. Fisher has wisely quoted in his prefatory remarks on 'Hawks and Owls from the Standpoint of the Farmer,' 'a little knowledge is a dangerous thing.'

"One of the most subtle delusions in our estimate of the good or evil done by a certain species is a tendency to cling to old-fashioned and often false views of the economy of those species upon which it subsists. Take, as an instance, the barn owl, whose wonderful record as a mouser has suddenly set him so high in the estimate of the up-to-date farmer and zoölogist. What evidence have we that the commoner species of vole or meadow mouse (*Microtus pennsylvanicus*), which haunts our pastures in the Middle and New England States, and forms nine-tenths of the barn owl's food in that region, is, as universally supposed, an unmixed evil to agriculture? Of course, the popular verdict is

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dead against the mouse in this instance. But it is a fact that not 1 per cent. of the study devoted to owl stomachs has yet been directed to the food habits of this mouse. In fact, no scientific investigation of the diet of the meadow mouse has yet been published. Its claim to a position in nature's economy, quite on a plane with many species which we now consider useful, or at least harmless to man's interest, is one which the economists would do well to consider."

I sum up the result of my feelings, in regard to this state of things, in the following paragraph:

"As we take up one by one the instances of so-called 'noxious' and 'beneficial' animals, placing ourselves in that unselfish attitude to creation which seeks the greatest good for the greatest number, and as far as in us lies searching out with diviner insight the end from the beginning, how strong the conviction comes that the wisest verdicts of economic zoölogy may fall short of the truth, and are often fraught with disaster. The dire results of exterminating, in some cases by decree, in others by neglect, the so-called noxious animals and many of the insectivorous birds, in certain parts of Europe, is an object lesson for America. From the tyranny of the gamekeeper and his titled master we may hope to be spared, but the lawlessness of the lumberman, the poacher, the plumassier, the zoölogist and the small boy with a gun, is an ever-present menace. Against these wasteful tendencies of a lusty young nation, revelling in the careless wealth of boundless possessions and of natural resources which once seemed inexhaustible, we rejoice to observe a growing protest. The Agassiz Association, the Audubon Society, the A. O. U. committee on the protection of birds, the changing game laws of our States, the forestry associations, the boards of public instruction, the natural history societies and writers of to-day, and, above all, the National and State Departments of Agriculture, in their bureaus of economic zoölogy, are a mighty and providential power for the reversal of the brutal misconception of nature, which grew apace with the young life of our nation. Fortunately, we have called a halt before our losses were irretrievable. We are getting slow to believe what the prophets have told us, and are relying less on what may be termed the feudal instinct of

self-preservation than on the hard-pan facts of zoölogy. We are giving beast and bird and creeping thing the benefit of the doubt. We are telling the panic-stricken farmer to keep on going slow when he sees a snake in the grass, a crow in the cornfield, a hen hawk or an owl in the meadow, or a weasel in the woodpile. But we must go further, striving to teach not only the economy which adds to wealth, but that also which adds in a larger sense to the sum of human happiness. Who can calculate the benefits, mortal and immortal, which accrue from the mere presence of created things among us? The song of bird is not more cheering, more instructive, than hum of bee or low of kine to many a soul. Can we not recall the delight and surprise of a nearer acquaintance with some shy, outlawed creature of the woodlands, which prejudice or mistaken economy has put under the ban? In the serious problems of extermination and prevention which confront him, it is undoubtedly the province of the economist of the future to carefully weigh these considerations."

Thanking you for your kind attention, and hoping all of you who feel sleepy will now be waked up, I now leave the discussion in your hands. (Applause.)

The Chairman—The bird question is now open to the members of the board for discussion.

Mr. Black—Mr. President, I don't want anyone to understand because I have spoken that I include any other person. Notwithstanding what I say, I am just as strongly a friend to all birds. But many an old resident of this State knows that with the large increase in the robins it has got to be a serious matter to the fruit growers of this State, and in some way we must be protected against destruction by these birds or many of our choicest fruits must go to the wall. And we don't propose to let sentiment or anything else stand in our way. We are going to try and get relief through our Legislature in some way. We don't propose, and we don't want, to annihilate the robin: we could not do it if we tried. Until this last protection given to him, he was shot in all seasons for food and for thieving; but still we couldn't annihilate him. He was, however, kept down to moderate numbers, and we didn't feel his loss. He has destroyed many of our

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cherries, and we supposed he would give us something in return; but after long experience I am satisfied that as an insect destroyer he has done us no good at all. And we don't want any higher authority for that than Dr. Smith, our State Entomologist. He will tell you the same thing. All his friends are entomologists, and all they tell us is, he eats 60 per cent. of insect food. They don't tell us what that food is, whether it is injurious to horticulturists or not. The wire grub he destroys don't matter much. Very few cut-worms he takes, because they are a night insect, and work in the dark. But when the cherry season comes, the first of June, we find the robin in the cherry tree; when he is done there he goes to the raspberries, then to the blackberries, and finally the wild cherries and cedar berries, if he can't get anything else. You never see a robin eating insects when he can get anything else.

Mr. Denise—Mr. Chairman, our friend Black seems to be full of trouble; he has lived here all this time, and he has succeeded in business very nicely; he is doing very well, indeed, notwithstanding what the birds have done to his cherries. I don't think the robin has hurt him a great deal during the last fifty years. We have no desire to destroy the robin. I was in California a few months ago, and I never saw so many birds as I saw there, and I spoke about it, and they told me they had a law prohibiting the killing of any birds whatever; and yet I don't know that there is any State in the Union where so much fruit is grown as in California. I may miss a few cherries on my farm; the bird gets a few of them, but there are certainly enough left for me, and I would be very sorry to see this State Board of Agriculture go on record as wanting to kill the birds.

Mr. Roberts—I was very much interested in the remarks of friend Rhoads. He read the law as it was enacted fifty years ago. That law is about right to-day. It enumerated all those birds natural to us here, and that it is unlawful to kill them, excepting in the case of a man on his own premises. Now, if the robin destroys the crop of my friend, Charles Black, I would say that Charles Black might have the opportunity of charging away on him on his own premises, and there I would draw the line. I like the robin. One of the best crops we raise is cherries, and the

robins take a few, of course, and they are welcome to them. But the robins have never annoyed us much, and I would be sorry to have any general law passed on the subject; but that old original law is, in my judgment, right. I believe that every man, in a measure, so far as his own interests are concerned and the welfare of his crops, should be at liberty to get rid of them on his own premises.

Mr. Black—All we ask is for the fruit grower to have the right to protect his fruit when the robins are stealing it. If we shoot the few robins that destroy our fruit we would not annihilate them. If we are going to protect a thief because he has got a few good qualities, why not protect another thief because he steals not a hundred but thousands of dollars, like robins would steal in the matter of value?

Elias Black—A man, to be a successful farmer or a successful horticulturist, must be a lover of nature, and if he is a lover of nature he will be a lover of birds. If you will come down to my place I will show you things stuck up in my trees to protect the birds from the cats, but when the robins came, as they did last year, and took almost every raspberry, every strawberry, cleared me out clean, the case is different. The professor may tell me that 100 per cent. of his food is insects, and Mr. Rhoads may tell me that he ought to be protected, but what good does he do me if he destroys all the insects that eat my berries, if he eats the berries too? This is sentimental talk, gentlemen, it is mere quibbling. As Mr. Cleveland once said, "this is a condition, and not a theory, that confronts us." When I send our pickers to the raspberry patch, and they come back saying there are no berries, the birds were there before them, for the birds go to work at daybreak, while the men do not begin before seven o'clock in the morning, we have no protection whatever. Brother Roberts has struck the nail on the head. I don't want a law passed that the boys shall go and kill every bird indiscriminately, but I say I have a right to protect my own property.

Dr. Ward—Mr. Chairman, there were adverse climatic conditions last year, so that we as fruit growers lost the main part of our crops. As many of you know, I am very largely engaged in growing currants, raspberries, strawberries and cherries. As

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Mr. Dye, our secretary, knows, he visited me two or three years ago, when I was right in the height of my cherry crop; that year, notwithstanding the robins got some of the fruit, I was enabled to market between five and six tons of cherries. Now and then they will go through and, of course, will always take the best fruit, but let us plan so that we can market some, and give the birds a share. As I say, last year there were climatic conditions such that our crops were almost entirely cut off, but that was not the fault of the robins. For the little fruit they take from me, the songs of the birds in the early morning more than pay me, and just as soon as I have to give up the birds I am going to give up fruit growing; I am going into some other occupation.

A Member—Mr. President, I think the robin is a good deal more considerate with friend Ward than he is with the rest of us. They are not distributed equally over this State; in some sections, where there is large fruit growing and a great deal of food like that, like all other birds or animals, there they congregate; and in our section, where fruit growing is pretty large, they overrun us. I had four acres of raspberries and blackberries the last season that were in a young apple orchard; you could go in there of a morning and count the robins by hundreds. They took the first picking of the raspberries entirely out of that patch, and we had small patches where they took them all; and where they, as I say, congregate in such numbers, they are very destructive to the fruit grower, and the minimum protection we ask would not interfere with Dr. Ward or anybody else who did not want to shoot the robin. All we want is a law that the one that can prove the robin is doing him damage shall be at liberty to protect himself. That is all, and it would not interfere with anyone. It wouldn't interfere with the man who don't want to shoot the robin; it wouldn't affect the man where the robin wasn't destroying his fruit. I say it is in sections, and not generally over the State, that the trouble lies. There are in some places very few robins, but where they come in such numbers, as they do with us, they are unbearable, and we don't intend to give up fruit culture for their benefit.

Secretary Dye—Mr. Chairman, I would ask Governor Hoard if they have any birds in Wisconsin, and, if so, what do they do with them?

Ex-Governor Hoard—Shoot them. I have listened to this discussion with a great deal of interest. I am a lover of birds and a lover of sport, but I have had for a great many years a conviction that the invasion of fire-arms and the greed of men for bird life was driving the farmer into another hole as bad as could be conceived of, and it has seemed to me that such destruction was a disturbing of the balance of creation. I heard a gentleman say here to-night that the wire grub did not do much hurt. In 1887 we had a very severe drought in Wisconsin. We have there very extensive blue-grass pastures and lawns; the blue grass, you know, makes a very favorite lawn, and also one of the finest pastures you can have. Well, the drought prevailed to such an extent that the wire grub ate off the blue grass roots over thousands of acres of blue-grass pasture, and I have taken up a bit of the turf and rolled it right up just as you would a carpet. One of the most interesting things to me was to watch the flicker and the robin digging wire grubs at this time.

Mr. Black—You did not have any cherries, did you?

Ex-Governor Hoard—Oh, yes, we did; we had a few cherries then—but one experience at a time. (Applause.) I studied those birds, became interested in watching them, and I saw them at work in my own pasture, thousands of them. If you turned hogs loose in the pasture they would root up the pasture tremendously, searching for those wire grubs, and the injury to our pastures was tremendous; they didn't recover from it for two or three years; but almost in every instance where the flickers and robins worked the pastures and the lawns recovered. Now, I don't know that we are a good deal wiser than the great Maker of all this animal life, I don't know that we can run this creation a great deal better than he could; at all events, it has not yet been understood or found out, or enacted, in any State I know of. (Applause.)

Mr. Roberts—There is one other point, Mr. President. On our old farm, where I have been residing, there are some mulberry trees, and they bear a lot of mulberries, which are very sweet and ripen very early in the season, and all the birds around do have a jolly time there; and I think a few mulberry trees will go very far towards preserving the cherries.

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Dr. J. B. Smith—Mr. Chairman and gentlemen, in this matter I am going to speak entirely from the entomological standpoint, and the effect of the robin on the insect, as I have observed it here. In the first place, you don't want to destroy the robin. No one wants to deny the fact that he is a useful bird in certain directions; he is entitled to all the credit for what he undoubtedly does, and so is every other bird. When the Governor talks of disturbing the balance of nature, he must realize as well as anyone that we have been doing that right straight along, ever since we have been cutting down forests and planting crops; that was one of the greatest disturbances you could have, and just as soon as you did that you gave opportunities for insect development that were not there previously, and you destroyed shelter for a great many birds, practically made bird life impossible, and you made the operations of nature so difficult that certain creatures died out and others became abandoned. It was necessary to preserve our crops and ourselves against the results of what we had done. Somehow this disturbed balance must be evened up, and therefore we have got to spray, we have got to do all sorts of things to protect our plants and fruits against enemies. The robin in the orchard is practically a useless bird. I don't mean to say the robin does not eat insects; it does eat a good many; but when you say the robin eats 60 per cent., or that 60 per cent. of his food is insects, that may be entirely true, and it may not be expressing a solitary thing to the advantage of the fruit grower. Because a bird eats an insect injurious to the fruit grower, he is not necessarily beneficial to the fruit grower in any manner, whatever he may be in other directions. I am speaking of the robin merely in his relation to fruit growing and fruit-growing interests. And I say, so far as horticulturists are concerned, the robin is not entitled to protection. It means merely he does not pay for what he eats in the orchard. I have watched the robin more or less for ten years. A few years ago, in New Brunswick, he was not a game bird. It is only a few years ago that the robin has not been shot regularly, and since the robin has been systematically protected he has increased enormously. We see a vast number in the vicinity of New Brunswick. Until within the last two years they were a greater nuisance than the

English sparrow. I like to see the robin come in the spring, and so far as the injury he does me is concerned, it does not amount to anything, I haven't enough to amount to anything; but my experience is simply a sample of what will happen elsewhere when the number increases. Take the wild cherries out of the orchards, take out your wild fruit; because of your wild fruit you raise insects, which get on your other fruit. I have been trying to do that. Now, then, we are told by the bird lovers, "plant fruits; give them an opportunity to get wild fruits"; whereas, from the other standpoint, I say we have got to get rid of the wild fruit in order to protect our cultivated orchards from the insects. The two don't gee. All we ask is this, just what Mr. Roberts, as I understand, claims, that you have a natural right, and that is that a man on his own grounds should be entitled to destroy birds actually engaged in stealing his fruit, that he should not have the right to sell or in any way dispose of the birds so killed; and, furthermore, that none of the birds so killed should be shipped outside of the State. The object is to limit the right to this class of people, to give the fruit grower a right to protect himself to some extent.

Mr. Hoard—I think the gentleman has taken a somewhat partial view of this matter, if he claims the robin is not hunted. The robin goes South, and if you will go into almost any town in the Southern States you will find them hanging there in hundreds and thousands.

Mr. Smith—I am perfectly aware of that, and that is one more reason we ought to have the right to protect ourselves, whereas in the Southern States they make a market of them.

Mr. Hoard—That decreases them to an enormous extent.

A Member—At our expense.

Mr. Hoard—It don't decrease them there at your expense. They are killed in the South in a way that shocked my feelings exceedingly. While doing some lecture work in Georgia, in thirty or forty towns, I don't think there was an exception where I did not see strings of robins hanging in all the market places. I don't know how it is with you, but in Wisconsin, where we grow a large amount of small fruit, I heard very little complaint of the robin. In my own town, it is a very small fruit-producing

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section, and I don't think the robin has been increasing with us at all over what they were thirty years ago. Every man must look at the question from his own standpoint.

Mr. Forbush—I don't wish to exculpate the robin over here. You remember I stated the robin might be a pest to the horticulturist at times, but again he may be just the reverse.

A Member—Are you going to protect the fruit grower at the expense of the other branches of agriculture?

Agricultural Education.

BY DR. JAMES MILLS.

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Agricultural Education.

BY DR. JAMES MILLS.

I am glad to have an opportunity of meeting so large a representation of the farmers of the State of New Jersey. Here you are in the garden of the continent, near what many of your people consider the hub of the universe, and presumably in the vanguard of civilization—leaders, or torch-bearers, in mental development and material progress.

I am not so well acquainted with you as with your fellow-countrymen a little further north; but, speaking generally, I may say that I have many warm friends in this country, and I have come to regard you as a very shrewd, able and progressive people, who, in some respects, resemble the Scotch—the canny, intelligent, progressive, and, I might almost say, aggressive Scotch, who push their way to the front or near the front in every country from the burning South to the frozen North of the habitable earth; men who believe in the perseverance of the saints, who try to keep the Sabbath day and everything else they can get their hands on, and have unbounded confidence in themselves as the special favorites of an all-wise Providence; for you know it is said that a thoughtful Scott once offered up on behalf of himself and his countrymen the prayer, “Lord, gie us a good opinion o’ oursel,” and that that Scotchman’s prayer was so abundantly answered that it has never since been necessary to repeat the petition. It is not, of course, for me to say how closely the average American resembles the typical Scott, but I may say that I respect both and wish them well.

Now, at the outset, I wish to state that we in Canada do not regard ourselves as at all in the race with you in the matter of agriculture or agricultural education. We are a small people,

working along in our own way, and we freely concede to you the first place in these matters. We expect you to set the example—to lead the way; and I must honestly confess that my only reason for being here to-day and venturing to read a paper is the fact that your Secretary, Mr. Dye, invited me to come, and his wife is a special friend of mine, born near where I live and reared under similar conditions.

Agricultural education may be spoken of as a plant, but a slow-growing plant so far as the Dominion of Canada is concerned. It was set out in Canada many years ago; but through the opposition of those among us who were wedded to academic ideals in education, and the no less persistent but utterly unaccountable opposition of the farmers themselves, this plant was stunted at the beginning and not allowed to grow much for a long time. It struggled on, however, for a generation or more, till at length it became a respectable sapling; and now, I am glad to say, it is showing signs of becoming a large and valuable tree.

In this department of educational work, I presume that you and we have been moving along almost the same lines and have been using the same or similar agencies. Apart from schools and colleges, we have had in our country a number of agencies which have assisted indirectly in the work of agricultural education—agricultural papers and periodicals, agricultural societies, live stock and dairy associations, horticultural societies, farmers' institutes, and similar organizations. You know the kind of work done and the influence exerted by these agencies, varying in kind and degree, but all contributing towards education on practical lines.

In an effort to group together in brief and intelligible form my observations on agricultural education in Canada, I shall say a few words under the following heads: Societies and Associations; Fairs, especially our Winter Fairs; Traveling Dairies and Instruction in Creameries and Cheese Factories; Fruit Experiment Stations; Dominion Experimental Farms; Public Schools; Dairy Schools; Farmers' Institutes; Agricultural Schools and Colleges.

1. *Societies and Associations.*—We have agricultural societies, a dominion horse breeders' association, a cattle breeders' associa-

tion, a sheep breeders' association a swine breeders' association, poultry associations, dairy associations, a fruit growers' association, a large number of horticultural societies, and an entomological society—all receiving annual grants from their respective legislatures, holding annual meetings, delivering addresses, reading and discussing papers, and publishing annual reports for distribution among farmers. The most notable advance in the work of our agricultural societies for some time past has been the sending of experts to the fall fairs, to judge live stock and fruit, and give publicly the reasons for their awards for the information and benefit of those who may be present when the judging is done. This plan is working well and the results seem quite satisfactory. Our Fruit Growers' Association publishes a monthly journal, and has recently introduced the practice of holding series of orchard meetings for brief addresses and practical demonstrations in pruning and in spraying for the destruction of insects and fungous diseases. The meetings are arranged for by the secretary of the association, and we regard the move as a step in the right direction. I need not go further into the work of our societies and associations.

2. *Fairs, Especially our Winter Fairs.*—We have township and county fairs all over the country, spending in the aggregate a large sum of money, and in many instances with very questionable results. No doubt they show fairly well what can be done by the best practice of each locality in grain growing, root cultivation, stock raising, and fruit culture; but in order to secure a good or even a fair attendance at these fairs, the directors too often introduce what they call "attractions," that is, horse racing and various kinds of side shows, in which fakirs and mountebanks vitiate the taste of our young people and turn their attention away from the real objects of the show. I might say more, but a word is sufficient.

We have also several large annual fairs at central points, such as Halifax, St. John, Ottawa, Toronto, London, and Winnipeg. The Industrial Fair at Toronto during the first two weeks in September as regards extent, quality, and educational value, is one of the best fairs I have ever attended. Both by well-traveled

Canadians and by many visitors from the United States it is pronounced the finest annual fair on the continent.

Further, within the last five or six years, we have held what we call Winter Fairs, at Guelph, in Western Ontario; Ottawa, in Eastern Ontario, and Amherst, in Nova Scotia. These fairs are held in large buildings erected for the purpose, and consist of exhibits of fat cattle, fat sheep, bacon hogs, dairy cows and poultry. In each Winter Fair building there is a slaughter house; a room for hanging, examining and comparing carcasses of beef, mutton and pork; and a galleried auditorium for lectures and demonstrations, given, first, on the live animals after the prizes have been awarded, and subsequently, on the carcasses of the animals that got the prizes—both exhibited, examined, and discussed on the dais of the auditorium, in the presence of large numbers of farmers who observe, listen, and ask questions during the last four days of the show. The dairy cows are tested, judged and brought to the dais of the auditorium for public examination and discussion. The poultry also, living and dead—usually a very large exhibit—is judged, and both live and dead birds are then taken to the auditorium to be exhibited and discussed by experts in presence of the people. In our judgment these winter fairs have great educational value, and do much to enlighten and improve the farmers of our country. We intend to have a horticultural Winter Fair at Toronto in December or January next.

Traveling Dairies and Organized Instruction in Creameries and Cheese Factories.—In June, 1891, we started a traveling dairy in the Province of Ontario, consisting of a span of carriage horses; a good spring wagon, with a regular carriage top in front and a box for home dairy appliances with a tarpaulin cover behind; a first-class buttermaker; the necessary supply of utensils, and a good dairyman as lecturer-in-charge. We sent out one such dairy the first year, increased the number to three the second year, and kept them at work for six years—from May to November each year—till the whole Province was covered. Nova Scotia has since sent out two dairies in charge of young women from our Guelph Dairy School, with two men to drive the teams and do the heavier and rougher part of the work. And I need scarcely

say that the results in both provinces have been eminently satisfactory. There has been a marked improvement in the quality of the butter both in hotels and in private houses all over these provinces. Much more butter is now consumed, and higher prices are paid for it.

Then, as regards instruction in creameries and cheese factories, I may say that our Dairy Associations, which receive annual grants from the Government, sent instructors for years past to factories which desired it and were willing to pay \$5.00 each toward the expenses; but recently the work has been taken over by the Minister of Agriculture for the Province, and the results are much more satisfactory. Acting through the Superintendent of Farmers' Institutes, the Minister appointed two of the best men he could get to take charge of the work, one in the eastern part of the Province and the other in the west. These men grouped into syndicates of 20 or 25 each those creameries and factories which desired instruction and were willing to pay \$15 apiece for the year. The heads then selected their instructors and sent one to each group—twenty-seven instructors under two directors to look after the work in seventy creameries and 600 cheese factories last season. The results are most gratifying—a great improvement in the factories, especially in the matter of drainage and equable, cool temperatures in curing-rooms; greater cleanliness; better methods; larger product from milk, and higher prices for butter and cheese. I think that nearly all the factories in the Province of Ontario will ask for instruction next year, as none of them can afford to fall behind in the race.

Fruit Experiment Stations.—We have in the Province of Ontario eleven fruit experiment stations and two sub-stations for testing varieties of fruit—their characteristics and intrinsic merits, the soils to which they are adapted, and the climatic conditions under which they may be expected to thrive. These stations are controlled by a board of six persons—the President of the Agricultural College, the Horticulturist of the Agricultural College, the Secretary of the Fruit-Growers' Association, and three expert fruit-growers elected annually by the Fruit-Growers' Association. The organization is very simple and inexpensive. Instead

of buying land, erecting buildings and appointing employees in different localities, we selected reliable, wide-awake fruit growers who had good orchards or plantations at the various points at which we wished to make tests—one for peaches, another for pears, a third for grapes, a fourth for apples, a fifth for plums, a sixth for cherries, a seventh for small fruits, an eighth for hardy apples, and so on, until we had covered fairly well the different soils and climatic conditions of the Province; and each of these chosen growers was asked (1) to report carefully once a year, according to instructions submitted, on his specialty, say, peaches; (2) to report on all other fruits which he might be growing; and (3) to plant, take care of, and report upon all varieties of his specialty which we might send him from time to time—on condition, *first*, that we would pay him a certain sum in cash, say, \$150 to \$175 a year, when his annual report was received and approved by the Board; and, *second*, that the varieties given him to test should become his property, with the privilege of removing, after a given time, all which might prove to be worthless.

In this way, we managed to get on without any capital investment; we got quick returns, and in ten years we have done a large amount of valuable and instructive work for a small expenditure, varying from \$2,600 to \$3,100 a year, and this includes an allowance of \$250 a year to our Secretary for writing and illustrating a description of the Fruits of Ontario, to be published two years hence.

Dominion Experimental Farms.—Fully occupied as you are with your own work and surroundings, you have not, I presume, read or heard of our Dominion Experimental Farms. We have five such farms, under the directorship of Dr. William Sanders, of Ottawa, with a local staff to take charge and do the work on each farm. The Central Experimental Farm, at Ottawa, consists of 465 acres of land, equipped and manned for extensive experimental work in soil cultivation and crop-growing; stock breeding, feeding and management; poultry-raising; bee-keeping; dairying; fruit-growing; the testing of ornamental shrubs and trees; chemical research; botanical and entomological investigations; plant breeding, etc.

The other four farms are located where they are most needed to test varieties of crops and conduct experiments in the different parts and conditions of the country—one at Nappan, Nova Scotia, for the Maritime Provinces; one at Brandon, for Manitoba; one at Indian Head, for the Northwest Territories, and another at Agassiz, for British Columbia.

Agriculture in Public Schools.—Agriculture is a subject on the prescribed and fixed program of studies for schools in two provinces of the Dominion, for Forms IV and V of all rural public schools in the Province of Ontario, and for both public and high schools throughout the Province of Manitoba. This subject is also compulsory in all the schools of the Northwest Territories.

Agriculture is an optional subject in the schools of four provinces: Quebec, British Columbia, New Brunswick and Nova Scotia; but Nature Study lessons bearing on agriculture form part of the prescribed course of study for public schools in the two latter provinces.

So far, the chief difficulty has been to get qualified teachers, but this difficulty is being overcome; and I think I may say that hitherto the best results in school work have been accomplished by the Province of Nova Scotia.

Dairy Schools.—We have five dairy schools in the Dominion of Canada—three in the Province of Ontario, one in New Brunswick and one in Manitoba. These schools are well manned and fully equipped for giving the broadest and most thorough instruction and practical training in milk-testing, butter-making and cheese-making—offering long and short courses free of charge for farmers' sons and daughters and for professional butter-makers and cheese-makers from all parts of the Dominion.

Farmers' Institutes.—These do college extension work; and, when properly organized and well managed, they constitute the most efficient organization on this continent for stirring up, instructing and benefiting the farming community. We have an excellent system of Farmers' Institute in Canada; but I must reserve what I have to say on that subject till to-morrow.

Agricultural Schools and Colleges.—Canada is only beginning to realize that it is a country—that it has a great future before it. Hence it has only one agricultural college, properly so called.

There is an agricultural school at Truro, Nova Scotia, which the Legislature of that Province is enlarging, with a view to make it a strong and successful college; the Province of New Brunswick is planning for a college of agriculture at Fredericton; the Province of Quebec has a number of small agricultural schools—most of them connected with church institutions; Manitoba has recently passed an act to establish an agricultural college in that Province; and the Province of Ontario, with a population something over two millions, has what is known as the Ontario Agricultural College and Experimental Farm, at Guelph. This college was established by act of the Provincial Legislature in 1873, and was opened in May, 1874; so it is now in its thirtieth year. It has a farm of 550 acres; commodious farm, dairy, poultry and horticultural buildings; a good representation of the principal breeds of cattle, sheep, swine and poultry; a large garden, greenhouses, orchard, lawn and arboretum for practical work in horticulture; a good dairy herd, with buildings and equipment for instruction and experimental work in the handling of milk and butter, milk-testing, butter-making and cheese-making; physical, chemical, biological, bacteriological and horticultural laboratories; and nearly all that is required in the way of classrooms and museums. To this, we have recently added and are about to open a large and well-equipped department for instruction and practical work in Home Economics (or Domestic Science), Nature Study and Manual Training.

In this college three things are aimed at:

First and chiefly, to educate young men for work and life on the farm.

Second, to do experimental work in order, if possible, to solve some of the problems that confront Canadian farmers.

Third, to lead and encourage farmers in outside undertakings which, from time to time, seem likely to benefit the farming community; such, for instance, as the Farmers' Institutes, the Traveling Dairies, and the Fruit Experiment Stations.

The college has no department of mechanic arts, and till quite recently has not admitted girls, except for the Dairy Department. It gives the following courses:

(1) *A Two-Year Course*, intended especially for work and life on the farm. In this course we teach some English; elementary mathematics; the sciences bearing on agriculture; an outline of political economy; and always, from beginning to end, and with special emphasis, *agriculture, live stock, dairying and horticulture*. This leads to the Associate Diploma, and is called the Associate Course.

(2) *A Three-Year Course*. Those who reach a fixed standard in the *Two-Year Course* and give promise of being good, practical men, are allowed to remain a year longer and take an additional year's work for a Specialist Certificate in Agriculture or Horticulture.

(3) *A Four-Year Course*. Those who reach a still higher standard in general scholarship and practical knowledge in the *Two-Year Course*, are permitted to take two years' additional work and write on the examinations for the B. S. A. degree.

(4) *Short Courses*: (1) A two-weeks' course in Live Stock and Grain Judging; (2) a three-weeks' Creamery Course; (3) a four-weeks' course in Poultry Raising; and (4) a twelve-weeks' course in Dairying, including milk-testing, butter-making and cheese-making.

Of the college at Guelph, it may be truthfully said "*This one thing it does*"—it runs everything on agricultural lines. It does not make public school teachers; it does not make mechanics; it does not make professional men; it simply makes farmers. It has agricultural surroundings, an agricultural atmosphere, and agricultural enthusiasm; and of the young men who go to it from the farm, it sends back at least ninety per cent. to the farm with a practical training that will make them more progressive and successful workers; and with an increased liking for farm life, a greater respect for farmers and farming, and a feeling that the man who works with both his hands and his head is not for that reason any less of a gentleman than the man who works with his head alone. At the present time, there are 248 in the general course and there will be about 350 in the short courses for the year.

A considerable amount of experimental work is done in the live stock, dairy, poultry and horticultural departments; a good

deal of time is devoted to investigations in the physical, chemical, biological and bacteriological laboratories; and field experiments are gone into on a large scale. Forty-four acres are divided into small plots for testing varieties of crops, kinds of manure, methods of cultivation, selection of seed, dates of seeding, methods of planting and harvesting, etc.; and in connection with this, there is an extensive system of co-operative experiments on something over 3,000 farms owned by ex-students and others throughout the Province.

After long years of hard work, the college may, we think, claim to have made Guelph the Mecca of Ontario farmers. The farmers go there in large numbers every year. In the month of June, the Farmers' Institutes run excursions to the college, numbering from 25,000 to 40,000 a year for the last seven or eight years—farmers and their families going from year to year for an outing and to learn what they can.

What, you ask, are the effects of what has been done by the various agencies mentioned, in the way of agricultural education? And the answer is—

1. The farmers of our country are *producing more* per unit than formerly. In the Province of Ontario, for example, with a stationary population (for many go west), and little or no increase in the price of farm products, there has been a very remarkable increase in the sums received for the agricultural products exported from the province in the last ten years as compared with the previous decade.

2. They are *living better*—getting more of the necessities and comforts of life for their labor.

3. They are *more intelligent*. Evidence of this is seen in the fact that they are reading more than formerly and are much more anxious for knowledge. It is seen also in the character of the discussions at our Farmers' Institutes.

4. They are *more refined*; they dress better; and they look better than in the days gone by.

5. During the last fifteen years there has been a *general uplift* of the farming community. I have ample opportunities for studying the situation; I see pretty much the same people every summer

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—from 20,000 to 40,000 a year,—and I have no hesitation in making the statement.

6. There is less of a disposition among our farmers than there was formerly to apologize for themselves and their occupation. They have more respect for themselves, and their social standing is improving from year to year.

The Breeding of Better Horses.

BY JOHN GILMER SPEED, MENDHAM, N. J.

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For several years past we have been told by writers in newspapers and magazines that we were upon the eve of the Horseless Age. Reiteration is a very effective weapon, and so, many people have believed that the horse was soon to become obsolete and the great work he has been doing for man would in the future be performed by a substitution of machines propelled by steam, by gasoline, by compressed air and by electricity. This was jumping at an untoward conclusion, a belief, of a kind to which humans are very liable, in the mysterious unseen in favor of what is old, tried and proved.

In the second decade of the last century great preparations had been made to construct in the United States comprehensive systems of good common highways, uniting neighborhood with neighborhood and binding cities, towns and villages together by easy communication. Just as this great work was fairly begun and the lawmakers and executives of the States and the general government had been awakened to the necessity for it, the steam traction road came into being, and, its practical utility being proved, the common road-builders said to themselves and to one another: "What is the use?" and by general consent highway construction was stopped, our grandfathers evidently believing that railroads would do all the work of transportation and ordinary roads, other than grassy lanes on the farms, would not be needed. So effective was the blow then given to road improvement that it was more than half a century before our people realized that the extension of railways only emphasized the need for better common roads. And it is only now that we have begun to get what our fathers and grandfathers needed almost as much

as we do. This was a long abandonment of the common roads, which in many parts, indeed in most parts of the country, are a reproach to our civilization, for, as Professor Shaler of Harvard says, "The common roads of a country are at once the means and the measure of its civilization.

Does not this little story of the roads teach us a lesson very applicable at the moment to the horse-breeding industry? I think so, and the purpose of this paper is to point out how we can avert a disaster and secure for ourselves and our progeny profit instead of loss, or, as Shakespeare puts it:

"Out of this nettle, danger, pluck this flower, safety."

And in our efforts to do this we must neither overrate nor underrate the practical importance and the practical utility of the electric traction cars, the automobiles and the other agencies which some have concluded are to precipitate a horseless age. These things, to use the familiar expression of the day, have "come to stay," and they are going to be, without any question, more rather than less important. There will be fewer horses used in the great cities for purely utilitarian purposes, fewer used even in the country in going quickly from place to place. The automobile will be simplified and cheapened almost as much as the bicycle has been, and in a few years a man will not need to be rich to be able to keep one in his barn and use it when he chooses. A man does not need to be a prophet to say this confidently. But this is not a death blow to the horse. By no means. How will we till our lands and harvest our crops without the use of horses? I am well aware that in some parts of the country much of this work is done by steam machinery; but I also am aware that steam machinery is not adapted for general use except in sections comparatively level and tolerably free from stones. I do not believe that such agencies will ever be used to any great extent in New Jersey, which, I am told, is not only per acre the richest State in the Union in manufactured products, but also the richest per acre in agricultural products. As we are trying to do some thinking for the people of our own State, it is well to bear more in mind our home needs than those, say, of Iowa and Nebraska. So we had as well dismiss the false notion that in a little while

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we are not going to need horses any more. We shall always need them, and a splendid thing for the human family it is that this is so. Baron Cuvier, the great naturalist, declared that the "dog is the strangest, the most complete and most useful conquest ever made by man." I agree to that in part, but I believe that the horse has been the most useful conquest during the immediate centuries past; and further, that he is as valuable to-day as ever.

The horse has kept pace with the great fighting machinery of the world, and his development and modification into types has in a very great measure been caused and determined by the needs of the armies which have fought the battles of civilization and will continue to fight them until the era of peace and good will on earth has become a reality. I am afraid that we are not exactly on the eve of that era. To-day the horse is as requisite to the fighting men as he was when the Medieval knights rode abroad with lance and shield to right the wrongs of a wicked though simple world. And the armies, next to the farmers, are the greatest users of horses in the world. That, to be sure, is not the case in this country, where our army is a mere skeleton to be builded upon in time of need, a nucleus to gather around in time of danger; but in European countries the armies are immense and being added to year by year. In time of war mounts are needed and Europeans look to this country with misplaced confidence to be supplied when their own horses are exhausted. I say misplaced confidence because we have only recently seen that we did not have horses enough to go around. When we had our little misunderstanding with Spain and later needed to conquer the Philippines, our own army had to be expanded, and, of course, many thousands of horses were needed. At the same time the British were fighting the Boers, and looked to us for re-mounts when their cavalry were unhorsed by the sharpshooters in the South African veldt. The demand was so great that young horses fit for chargers were practically exhausted in this country, and prices for this class of animal were almost doubled. This was just at a time when apprehension that the trolley and automobile would do away with horses had got in its deadly work, and the actual number of horses bred in the United States had materially decreased. And so the farmers, who are the great

horse breeders, lost millions of dollars which they might have had as well as not. At this moment a war in the far East is threatened. Indeed, a European war is always threatened, and sooner or later it is sure to come. When it does come, though we do not pray for the hastening of the day when our brothers across the sea shall begin cutting each other's throats and blowing one another to smithereens, we should be prepared as good and thrifty husbandmen to take all the profit that may accrue. In the item of horses alone the balance of trade when that time comes will be prodigious. And most of it should go into the pockets of the honest farmers, who, time out of mind, have bemoaned their hard lot until they have come to believe it true.

But from this great source of profit they will never get the utmost until they learn what kind of horse will be needed and how to breed that kind of horse. They should breed better, and they should breed to a type. As it happens, under the changed conditions spoken of, the better horse needed for the army is pretty nearly identical with the kind of horse that is best adapted for farm use and for city parks as well. I am aware that there are many who will not agree with me in this statement. Very well, the world is wide enough for more than one idea, and I claim no monopoly for mine, though I hold to it until I can replace it with another that seems to be sounder in fact and more reasonable in practice. As I look out of my window and see the wretched plugs that are driven along the highway near my house, I wonder that men should be willing to feed the creatures that they use in their work as well as for their pleasure. A farm horse need not be a misshapen beast of mongrel and haphazard breeding. There is neither sense nor economy in such practice. It costs not a penny more to raise or to keep a good horse than it does a poor one, and I believe every farmer knows this, if he is capable of knowing anything. The adoption of these agencies spoken of in substitution of horses will teach it to him if nothing else does. But he should be forehanded enough to learn in advance of sad personal experience. The time has already come when poor horses are next to worthless, and in value not worth their keep. And at this time good horses are in greater demand and fetch larger prices than ever before. By good horses I do not mean

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merely thoroughbred race-horses and two-minute trotters, but I mean general-utility horses of good conformation, reasonable speed and tolerable action. That is the kind of horse farmers should breed. The fine specimens he can sell at good and profitable prices, the others he can use at home and also use profitably. This, however, will never be the case until the farmers learn that they should breed to a type, and also learn how this may be done. I make bold to say that almost nine-tenths of the breeding in America has been entirely haphazard, while a large proportion of that with design has been unscientific and upon principles as false as possible. Considering this, it is amazing to me that the stock of horses in this country should be as good as it is. It is so because the early importations into this country were generally well selected and begun at a time when the Europeans, the English particularly, had learned that no horse blood was good unless quickened by that potent Oriental yeast which is transmitted only through the Arabs and the Barbs of the desert.

So that we may understand what I mean by this, let us glance very hurriedly at the history of the efforts to improve the horse in England, whence came pretty much all of what we may call the "basic stock" of America. When heavily armored knights were supplanted by a lighter cavalry, gunpowder having been introduced, the horses in England were not fit for the new work demanded of them. They were heavy animals of mongrel stock, and seemingly a poor foundation on which to make any improvement. Henry VIII. issued a sweeping decree that all mares and stallions in the royal forests not up to a certain standard should be killed. Subsequent to his reign there were intelligent efforts to improve the breed, James I. buying an Arabian stallion, Markham's Arabian. This seems to have been a very unsatisfactory specimen and was greatly disliked by the Master of the Horse, the Duke of New Castle. His impression on the English horse was probably neither great nor beneficial, but there were better introductions of Eastern blood during the times of Charles II. of merry memory, and the effort to breed better horses was persistent and intelligent. By the time of William III., according to Blaine's "Rural Sports," the best horses in England were quite similar to the type now known as Cleveland Bays, though prob-

ably not so large. From this stock by means of the Arab blood—the Byerly Turk, the Darley Arabian, the Godolphin Barb, and two hundred and ten other stallions and mares—the thoroughbred racer was made, a type which has existed till now, and has been used to quicken the horse blood in two continents. From these improved English horses there were many importations into Virginia and New York for racing and for breeding. Having learned of the value of Eastern blood in improving the English horses, there were importations of Arabian stallions to this country long before we began keeping any trustworthy records. But what is known as the thoroughbred racer in America to-day has little, if any, of the American “basic blood” in his veins. He is purely English, and is said to have a cold strain unless both sire and dam trace back to the stud-book kept by the Messrs. Weatherby.

Our “basic stock” has been, however, undoubtedly improved by mixing with it this thoroughbred blood. When the first Europeans came to this continent there were no horses, though the paleontologists tell us that the rocks abound with fossils which show that *Equidæ* were numerous all over America in the Eocene period. The Spanish explorers and adventurers were the first to bring horses to America, and from the wanderers and castaways of the expeditions that went beyond the Mississippi and into the far west have sprung the wild horses of the plains, the hardy mustangs, which assisted the Indians in repelling the advances of the whites and at the same time helped the whites in the work of civilizing the western part of the country. The Spanish horses at that time were quite superior and were of Arab origin, having been introduced into Spain by the conquering Moors. Spain would not be a good country to go to now for equine blood, as the Spanish horses have deteriorated as the Spanish men have done. But the Spanish soldiers were well mounted on well-bred horses three hundred years ago, and the mustangs descended from them showed many evidences of superiority until they practically became extinct. In them lingered traces of this wonderful Eastern blood, the virtues of which I cannot insist upon too strongly. There is little of this mustang blood, however, in the “basic stock” which is almost entirely descended from the horses brought to

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the Atlantic coast colonies from Holland, France and England. Naturally those brought were carefully selected, for to bring a horse across the ocean was then, as it is now, a costly thing to do. And we can depend upon it that our hard-headed and more or less tight-fisted ancestors did not fail to count that cost. The trip over was hard, the life here was difficult, and those that lived to breed and flourish represented that great trial of animal life, "the survival of the fittest." In those early days there were no roads worthy of the name and journeys from place to place were made generally on horse-back, while freight was not infrequently carried in caravans just as it had been done in Medieval Europe and is still carried in the far East. The colonists needed strong, hardy and active horses, and to an extent I am persuaded that they had them. I suspect that the horses that were common on the Atlantic seaboard a century and a half ago were very like the sturdy animals now to be seen in the Province of Quebec, in Canada, a little way from the St. Lawrence river. Time has not exactly stood still in this part of the world, but nearly everything there seems to belong to an older century. The horses particularly seem to belong to an older time. They are not beautiful in conformation or in action, but still in many regards they are admirable. Harnessed in a calash, an ancient French, two-wheeled carriage, they get over ground with ease to themselves and satisfaction to their owners, covering great distances on very rough and primitive roads quickly and without distress. In endurance they are wonderful, and I have known of feats of hardihood which quite equal the familiar stories of the New England Morgans, that old-time type which historians have chronicled and poets have sung. These habitant horses of Quebec are a mixture of French and English blood, and here again there is historical evidence of the Eastern blood which comes from the deserts and the mountains where the Arabian nomads have lived and wandered time out of mind and out of record.

About New York the horses in the earlier Colonial era were first of Dutch breeding. Later these horses were blended with the English blood, while in Virginia and in New England the horses were purely English. Tested by the natural rule of exclu-

sion, "the survival of the fittest," our ancestors had good material with which to work when the time came that they could devote themselves to other than purely utilitarian pursuits yielding immediate results. When that time came, as it did just before and a little after the Revolutionary War, the efforts were intelligent and the results happy. The first definite type evolved was in New England, and I doubt exceedingly whether, in the making of this type, which forty years later became known as the Morgan horse, the thoroughbred blood of England figured at all. It is much more likely that it was produced by a union of Arab blood with that of our "basic stock." These Morgan horses were neat and symmetrical, with small heads, high crests, clean action, and a stamina which made our forefathers believe that there was nothing too great for their strength and their courage. They were not large, however, generally not being more than fifteen hands in height; but they were not small, for they were bulky in build, and nowadays would doubtless be classed as cobs of very high quality. When the Morgans were at their best as a type, a man named Justin Morgan took into Vermont a young stallion which he had bred at Springfield in Massachusetts, and in the effort by certain methods to convert a type into a family, he brought discredit upon the family, if not on the whole type. But the type did not perish until the Hambletonian craze took possession of the country, and madness in breeding became the rule instead of the exception.

The Morgan horse was a type, that is, a reproducing type, the great majority of them having similarity of conformation, action and other characteristics. Though this type had not been given a name it was recognized before the leading of the gray stallion Messenger, in 1788. This was a thoroughbred racer, and he had been a successful performer on the English turf. He traced directly to the Darley Arabian and the Godolphin Barb, and was, therefore, rich in that potent Eastern blood from which all the distinguished European horse types have sprung. It was found that the produce of Messenger out of American mares, especially of those which later were known as Morgans, could trot particularly fast; and long before he died, this stallion was rightly regarded as a valuable acquisition to the country. About him

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countless legends and fictions have grown, so that he seems more like a hero of romance than merely a flea-bitten gray horse of bad temper, worth about \$4,500. There is not an aspiring trotter in the country whose owner does not proudly trace his pedigree back to Messenger. But he was a great horse in his life, and in the history of the development of the horse in America his will always be one of the proudest places. He was rather a coarse horse in appearance, as was his great grandsire Sampson, in whose blood there was a cross of the Darley Arabian with the Godolphin Barb. This coarse appearance of Sampson and Messenger has induced an amusing but unscrupulous writer to impugn Messenger's breeding, and to say that his power to transmit the capacity to trot was due to Sampson's dam being a pacing mare. As a matter of fact, the progeny of Barbs are apt to pace, and the Godolphin progenitor of Messenger was a Barb. During the nineteen years of Messenger's life in this country he was in the stud near Philadelphia, on Long Island, in Orange county, N. Y., and in New Jersey; and the influence of his blood has been great and lasting. To this day the neighborhoods in which he served are noted for the superiority of their horses.

The next distinct type after the Morgan, that we had in America and of our own making, was known as the Clay, and they flourished greatly, especially in the western part of New York State, up to the time of the Civil War. These horses not only traced back to Messenger with Arab and Barb blood, but, subsequent to the Messenger crosses, in Andrew Jackson, the sire of Henry Clay, there were other infusions of Arab blood. These Clays were very similar to the Morgans, but were a trifle larger and also faster. Their size and speed were, no doubt, due to the closeness of their in-breeding. Though they were not large horses, they were of immense muscular power, and could trot all day. A story is told of Henry Clay, the horse from which this family of horses derived its name, that Mr. William Wadsworth of Geneseo, needed for his sister a doctor from Rochester, thirty-eight miles away. Henry Clay was harnessed to a two-seated wagon, and did the journey both ways in less than five hours. Neither Henry Clay nor his sire Andrew Jackson were

ever beaten. Henry Clay was bred in New York, but was sold when a colt to George M. Patchen, of New Jersey. Mr. Wadsworth coveted the horse, and went to Mr. Patchen to buy him. Patchen, not anxious to sell, finally put on a price which he thought prohibitive. "We will give the horse all the water he can drink," he said to Mr. Wadsworth, "and then weigh him, and you may give me one dollar a pound for him." Mr. Wadsworth promptly accepted, and the horse weighing 1,050 pounds, that fixed the price, which was paid immediately, and the horse was sent at once to Livingston county, New York.

Once when Mr. Wadsworth had a match at mile heats, best three in five, he drove his horse ninety-eight miles the day before the race, rather than pay forfeit, and then won the race, one heat being trotted in 2:35. This was in 1847. Consider the clumsy shoes, the heavy sulkies, and other impedimenta of that time, in comparison with the wire-like plates, ball-bearing, pneumatic-tired sulkies, and cobweb-like harness of to-day, and decide whether even the most phenomenal of our trotters is better than that. At any rate Henry Clay or his sire, Andrew Jackson, it makes no difference which, established a reproducing horse type symmetrical in conformation, speedy and graceful in action, hardy in constitution, kindly in disposition, and as courageous as possible. This type, fortunately, has not entirely perished, but so little of the blood has been preserved that the type is all but gone. Here was another victim of the Hambletonian craze and of the mistaken idea that "like begets like" without regard to the important blood influences which are all-controlling. Would a forester plant an acorn in a grove of maples and expect to get a combination of oak and maple because the ground had nurtured maples before and was peculiarly adapted to that kind of tree? If he did, we should think him a proper subject for an insane asylum. That, or like to that, is what the American horse-breeders have been doing for half a century. Among all of Messenger's progeny none has done him greater honor than the Clays, and it may be that in the final American type of horse Messenger's fame will be preserved through this family, which the obloquy of horse-breeding partisanship has not yet sufficed to kill.

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The next definite type in America was the Golddust family in Kentucky, bred by Mr. L. L. Dorsey, near Louisville. The sire of this family was by Vermont Morgan out of a dam half Arab and half thoroughbred. Golddust was born in 1854, and when he was at his best the Civil War was raging and the opportunity was poor indeed for breeding purposes. This was particularly so in the neighborhood of Golddust's home, which was in a region in which residents were kept in constant fear of guerrilla raids. These horses were very rich in Arab and Barb blood, as it came from both branches. The sire of Golddust's dam was by imported Zilcaadi, brought direct to this country from Syria. The granddam was by imported Barefoot, an English Anglo-Arab, in whose immediate ancestry there were many infusions of the Darley Arabian and the Godolphin Barb.

These Golddust horses were peculiarly handsome. They had size and substance and a notably clean and graceful action, besides speed and staying qualities. They were particularly adapted for light carriage work, and I know of no other family or type we have ever had which could have been so readily developed into splendid coach or heavy harness horses. When the Civil War was over, the *nouveaux riches*, who were controlling everything in the sporting world and had also invaded the most exclusive social circles, made for a time even the trotting tracks popular and fashionable. This was a poor time for a man who, being compelled by necessity to sell the produce of his stock-farm, was endeavoring also to develop a certain type of horse not peculiarly adapted to use on the trotting tracks. The Golddusts did win as trotters in the best company, but it is pretty certain that their highest merits were not in this direction. They, too, fell under the ban of those who cared nothing for scientific breeding, but looked only to time-tests of speed and held to the fallacious idea that "like begets like" without reference to the immutable laws which are recognized and understood by pretty nearly all horse-breeders in the civilized world, save only those who have been trying to establish the fast-trotting type in America.

Then we had the Hambletonian horse. We have him still, and, because we have him, we have not in the standard-bred trotter a fixed and reproducing type. The fiction about Hambletonian

is what is believed, and the truth is considered by those who are sincere in their faith in the standard-bred trotters as scandalously libellous. To begin with, the pedigree of Hambletonian as set down in the books is false. It was manufactured to suit the purposes of those who thought they could make money out of deception and fraud. Some of them made it, but their dupes have lost millions piled upon millions in the effort to reach a destination by a wrong road. It is quite true that the great grandsire of Hambletonian was Messenger, but when Messenger's blood reached Hambletonian it had been weakened by degeneracy and defiled by a Conestoga crossing, besides getting nobody knows what from his immediate dam. Hambletonian's grandsire was Mambrino, by Messenger, and bred in Westchester county, N. Y. He was sold when a yearling to Major William Jones, of Cold Spring Harbor, Long Island. He was such a sore disappointment to Major Jones, being very vicious and not able either to run or trot, that he virtually gave him away, and he was used on Long Island as a traveling stallion at a small fee—his Messenger blood being his only recommendation. John Treadwell, a Quaker farmer, near Jamaica, Long Island, had two Conestoga or Pennsylvania Dutch draft mares. Out of one of these mares by Mambrino was born Abdallah, the sire of Hambletonian. Abdallah was so bad tempered that he could never be broken to harness, but was ridden under the saddle. He had no speed either as a runner or trotter, not being able to do a mile in four minutes at any gait. He had a mule-like head and ears, a badly ewed neck and a rat tail. But he was a Messenger despite his Conestoga crossings, and some Kentuckians, seeking the Messenger blood, paid for him \$4,500 and took him to the blue grass State. But they did not keep him long. In about six months they were glad to sell him back to New York for \$500 to Messrs. Simmons and Smith, Bull's Head dealers, who bought him as a speculation. This was in 1849. The new owners being unable to sell him virtually gave him away. About this time a butcher, named Charles Kent, wanted a new horse for his butcher wagon, and traded his worn-out mare to Edmund Seeley, of Orange county, New York, for a steer for butchering. This mare had been bought by Kent from Alexander

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Campbell, of Bull's Head, paying \$40.00 for her, out of a drove of Western horses. She became the property of Bill Rysdyk, a hired man on Seeley's farm. She was bred to Abdallah, and the foal was the famous Hambletonian. When it became desirable to have a pedigree for Hambletonian this Charles Kent mare was said to be by imported Bellfounder, a Norfolk trotter. The pedigree makers were so earnest in their desire to appear with a clean record of ancestry that Alexander Campbell, the Bull's Head dealer, who had sold the mare to Charles Kent, was offered \$1,000 to subscribe to the fiction. He declined with honest indignation, but the fiction has been reiterated so persistently that many honest men believe it absolutely. The hackney breeders in England take advantage of the fiction and declare that our standard-bred trotters get their virtues from the hackney blood. The truth is that nobody knows anything about the breeding of the Charles Kent mare. It may have been good; it may have been bad; but certainly it is impossible to be as it is set down in the records, which really serious people quote as though they were repeating gospel truths. During the early part of Hambletonian's career he was exploited under other false pretenses, and this earlier falsehood accounts for his name, which has perplexed many persons who have wondered what it meant and whence it came. Bill Rysdyk, in looking around for a name that would indicate the Messenger blood in his stallion, tried to convey the idea that he was sired by Bishop's Hamiltonian, instead of the despised Abdallah.

There had been in the early years of the century a famous son of Messenger named after Alexander Hamilton. This horse finally become known as Bishop's Hamiltonian. In his effort to borrow the name, Rysdyk, being weak in his orthography, called his horse Rysdyk's Hambletonian. And so he lives in history—false in his pedigree as in his name. The public of that day believed this horse to be a son of Bishop's Hamiltonian, and for the sake of the Messenger blood he was served to the best mares in Orange county, and Orange county was rich in the Arab and Barb blood of the daughters and granddaughters of that great and unbeatable trotting horse, Andrew Jackson. No stallion ever had a better chance, and it was almost impossible that there should not have been good horses among his get. And there were. But

the bad blood of his ancestry, sire and grandsire being worthless degenerates, together with the utterly unmixable Conestoga blood in his granddam, have been continually cropping out in his progeny—for faults more readily reappear than perfections—until now, when it must be acknowledged that the boasted horse type of which he is said to be the founder is no type at all.

Thirteen years after Hambletonian's death the registers showed that he was the sire of 1,300 foals. His offspring had every chance that care and good training could give them, but notwithstanding this less than forty of them ever got into the 2:30 class of trotters, and the fastest of them all, Dexter, is more than suspected of having been sired by Henry Clay, who was standing in Orange county the season Dexter was begot, and there were those who always believed that both Henry Clay and Hambletonian covered the Star mare, Dexter's dam. Which was the father? Dexter in appearance, action and disposition was more Clay than Hambletonian. It did not suit the purpose of his breeder, Seeley, or of his later owner, Bonner, to have him other than a Hambletonian, and his speed helped along the theory of the Hambletonian zealots that "like begets like." This theory to which I have before alluded is that the produce of the fastest horse and the fastest mare will probably be a colt faster than either. This is making the individuals all-important and in every way superior to the family. It has not worked out in the way the theory points by any means, and the failure emphasizes a curious inconsistency of those who hold it. Hambletonian, they say, was the founder of their type. He could not trot fast, 3:18 being the best that he could do under Hiram Woodruff's training. Abdallah, his sire, could not trot at all; his sire, Mambrino, could not trot and would not run. It seems to me that the Hambletonians which have been fast trotters have had their speed not on account of their Hambletonian blood, but in spite of it, may be on account of the Clay or American Arab blood through the dams of many of his best offspring. Look at the record. One hundred and seven sons of Hambletonian, 40 years after the foaling of their sire, were the sires of 523 trotters with records of 2:30, less than five in a hundred for each animal, but indicating that the sons were better than the sire. Besides these 107, Hambletonian had six

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sons out of mares by Henry Clay or other Clay mares. These six sons of Clay mares were sires of 136 trotters in 2:30, or better, an average of more than 22 to a horse. Yes, the sons were better than the father, as they generally were much better bred.

It is not a grateful task to say these things about the Hambletonians, and so shake the cherished faith of some, while making others mad with anger. But the breeding of horses should be a science, and science rejects everything except demonstrated truth. The first time I told what I had learned about the Hambletonians and the false theory upon which breeders were endeavoring to establish the trotting-horse type, I received a letter from New Bedford in Massachusetts, inviting me to come there so that the writer might have the pleasure of kicking me across the State. Now, the people of Massachusetts are not usually so bellicose as this, and I did not like to refuse the invitation outright. So I wrote to the gentleman temperately, and begged him to tell me exactly how far it was across the State, as I did not feel like giving him too much pleasure, or subjecting myself to too much pain. I am afraid he is having a survey made.

We see that we have had three reproducing types of horses in America; but if we reject the standard-bred trotter as a type that reproduces with reasonable certainty we have now none that is American. And two or three out of a hundred, the percentage of standard-breds which trot fast, is not reasonable. To be sure we have other types in America, but they are not American. The thoroughbred, the hackney and the shires are English; the Orloffs are Russian; the Percherons are French. These are all such distinct types that any one with the slightest horse "gumption" can tell one at sight. How different with the standard-bred trotter. Let any one go to the New York Speedway and look at the horses there exhibited. They are probably the finest specimens of the so-called type in the country. But they are all sizes and shapes, with a variety of action almost bewildering. More of these standard-bred trotters pace than trot; still it is a trotting type according to the books. Why, the idea is condemned by an examination of those left after rejecting 97 in every 100 foaled. What would the breeder of fox terriers think if in a litter, say of ten, he had one fox terrier, one pug, three spaniels and five

common "yallers"? He would suspect that the mother had been wandering, or that there was a strong "yaller" streak in his canine stock. But the standard-bred owners go on year after year buoyed up with the gambler's hope, each praying that his will be the good fortune to own the winning ticket in the lottery.

Horse-breeding should not be a lottery; it should be a reasonable certainty. It can never be this unless we breed to a fixed type, such, for instance, as the Russian Orloff. This is so decided a type that at a recent sale in New York, old horsemen present could scarcely tell the new team that came into the ring from the old one that just departed. Indeed, the *New York Herald* objected to the Orloffs because there would be confusion in knowing Mr. Brown's team from Mrs. Smith's. The breeding of the Orloffs is conducted by the Russian Government, which took over Count Orloff's stud and maintains it for improving the breed of horses in the Empire.

That is what we shall have to come to in this country. May be not the Federal Government, but the State Governments. Every European country, except Great Britain, has a public stud for both public and government use. England's nobility, founded on the laws of primogeniture, absolves that country from this necessity. Her nobility and gentry, with studs descending from father to son through the generations, does this much-needed work, and does it well. Here we have never done it, and it may be long before we do; but I hope not, as we have now an opportunity, which, being lost, may never come to us again. We have in this country the nucleus of a stud, which could in a few years be largely expanded, of distinctly American horses of a very high class, and of exactly the sort that are most needed now and likely to be in even greater demand in the future.

In 1879 the Sultan of Turkey gave to General Grant two stallions, Leopard (Arab) and Linden Tree (Barb). Among the breeders of horses and students of animal life in this country, Mr. Randolph Huntington, of Oyster Bay, Long Island, has been well known for more than forty years. He has always held that blood influence was all-important in breeding, and kindred blood, when pure, could not be too closely mingled. Moreover, he has refused to be imposed upon by the forged pedigrees that were

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manufactured to make this and that family popular. In addition, being a man acquainted with the history of the horse in the world as well as in America, he has known that the potent blood in European types, as well as American types, was of Eastern origin. He hailed the coming of the Grant stallions, and prepared to use them by securing some half dozen Virgin Clay mares, themselves rich in Arab blood. With General Grant's consent, he bred these mares to Leopard and Linden Tree, and in a little while had a small collection of the greatest possible interest. He persevered in this for fifteen years, and had developed what he called an American Arab or a Clay Arabian. They were splendid animals, large, shapely, strong, fast and kindly. For the purpose of developing the type, the collection needed to be kept together, as Count Orloff kept his stud together until it was transferred to the Russian Government. Unfortunately, Mr. Huntington had associated with him in the ownership of the horses a New York lawyer who proved, in 1893, to be one of the most noted defaulters this country has known. Mr. Huntington was among the victims, and this valuable and interesting collection had to be sold and dispersed. Mr. Huntington, however, was able to retain a few of the best; and, though then an old man, he began his work over again, sustained by the strength of a great purpose, and encouraged by the belief that he was doing a good work for his country. By this time Mr. Huntington was recognized in England, France and Russia as a very enlightened breeder and among the elect of those who attribute to Eastern blood its rightful virtue.

His small collection was added to from England by Nazli, a pure-bred Muneghi-Hadryji Arabian mare, in foal to the Arab Kismet, a race-horse who in his class was unbeaten, though he had a long career in India and afterward in England. With this and other accessions he has pursued a course similar to that previous to the dispersal of his first collection, until now he has some forty head of horses, pure and half-bred Arabs. It takes time to develop a type—more time and money than any one person is generally able or willing to give. But in the short space of twenty-two years Mr. Huntington has twice proved that by the close breeding of pure Arabs and Clays he can secure horses of great

similarity in appearance and action, of much speed, of kindly dispositions and sturdy constitutions. Here, it seems to me, is the most promising chance we have had in forty years to establish an American type of that high character which the present conditions demand. With stallions from such a stud and mares taken from the common stock, the "basic stock" of the country, we could in a few years of careful breeding and a continual going back to the parent stock for fresh infusion of the improving blood, fill the whole country with splendid animals that would be at once a credit and a joy to their breeders and owners.

That many farmers have found horse-breeding unprofitable does not surprise me. In the cases I have inquired into—and I have been making inquiries for twenty-five years—I have generally found two causes for failure. One cause was due to the effort to get fast trotters; the other was due to the haphazard breeding of horses which were comparatively valueless. The farmers, the small farmers, I mean, in the Blue Grass region of Kentucky do not lose in their breeding ventures. But then most of them breed a type. They have a few thoroughbred mares, and they breed thoroughbreds. That is not practicable in any other part of the country, nor is it desirable; but in the other parts of the country the stock can be immensely improved by a careful selection of sires of similar but superior blood to the dams, so as to breed up always and never down. But the opportunity to establish a general parent stud, such as might now be had from Mr. Huntington, should never be lost sight of. We should make it a public question in the nation or even in this State. New Jersey would do herself proud to add a stud like this to the experiment station of which the President of this board is chief director. Before the time comes when we can make requisition on the experiment station for a stallion we have work to do in impressing upon the farmers of the State the necessity of breeding their own horses. In my neighborhood horse-breeding has almost stopped. Every spring droves of horses are brought in from the West and sold by the dealers, who take the notes of proprietors and the chattel mortgages of renters. Whenever I see this I am filled with amazement. These men, I say, should have all the horses they need, and not know that any of them ever cost a cent.

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An ordinary farmer with one hundred acres or so, with the product of two mares, which he could work the larger part of the time, would not only have all the horses he would ever need, but some to sell. A farmer should look upon his horse breeding as the thrifty mechanic and artisan looks upon his savings bank account. Here is where to put the pennies so that the dollars will look after themselves. I firmly believe that on any ordinary farm with a little grass land a farmer can raise one, two or three colts a year, and when they have arrived at working or selling age, not be conscious that they have cost him a penny. He will have fed them from the surplus; they will have subsisted on what otherwise would have gone to waste. In my neighborhood is a gentleman who has retired from farming after thirty years and is now living happily with a new and young wife on the accumulations of his years of toil. He told me the other day that with the exception of two mules and two mares he never bought a horse in his life. Instead of buying he was often a seller, though his farm was always well stocked from the product of the two mares he bought when a young man. Here is an example of intelligent farming and careful breeding, and it is a pleasure to see this man spending the evening of his life in happy ease and unaffected contentment. That is the way it should be with the generality of elderly farmers. Nothing will assist more materially than for them to breed their own horses and save the money the stock would otherwise cost. But there will be no particular success for any farmer unless he bears in mind that blood is the thing that tells, and that in breeding the great principle is to avoid striking contrasts and always seek for similarity.

There is no field in which there is greater promise of fortune than this of breeding the horses that are to be needed in the future. I say nothing against sport; I say nothing even against gambling; but I do believe that the improvement and the perpetuation of the horse does not depend either on the one or the other. We need, and shall always need, for our work and our pleasures, a sturdy, graceful, quick and symmetrical animal, ready and willing, intelligent and beautiful—the same animal, indeed, with modifications, that the Pharaohs used. These are

the animals we should use on our farms, that our children and children's children will use.

Marcus Aurelius, the last and the greatest of the Stoics, insisted that the past, being out of our reach, was none of our concern; so, also, that the future, not having come, did not belong to us, and, therefore, we should not try to control it. His theory left us only the present. That is well enough, perhaps, but I believe that the past has imposed upon us present duties, and that the proper fulfillment of them is a natural provision for posterity. So, let us learn of the past, act well our part in the present, that the future may not reproach us; let us be men of cheerful yesterdays, of brave to-days and confident to-morrows.

THE PEDIGREE OF HENRY CLAY.

"Henry Clay" was by "Andrew Jackson" out of the famous mare "Lady Surrey."

"Andrew Jackson" was by "Young Bashaw," and his dam was by "Why Not" by imported "Messenger," the granddam also being by imported "Messenger."

"Young Bashaw" was by the imported Arabian "Grand Bashaw"; his dam was "Pearl" by "First Consul" (Arab bred) out of "Fancy" by imported "Messenger" out of a daughter of "Rockingham."

"Henry Clay's" dam, "Lady Surrey," was bred in the neighborhood of Quebec, Ontario, and was brought, with twelve other horses, into New York, and sold, with her mate, "Croppy," to one of the Wisner family, of Goshen. These horses were then known as Kanucks, though some called them "pile drivers," because of their high knee actions. Records were not kept in Quebec, but they were evidently of Barb blood, being descended from horses imported from France.

This shows how rich in Arab and Barb blood Henry Clay was, and besides how many Messenger crosses he had through his sire. Hambletonian's blood, compared to Clay's,

"Is as moonlight unto sunlight,
Is as water unto wine."

Dairy Management in New Jersey.

BY DR. EDWARD B. VOORHEES.

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In 1902 the Executive Committee of the State Board, with the purpose of securing accurate information concerning the progress of the dairy business in the State, as well as methods of practice adopted by the leading dairymen, planned and ordered carried out an investigation, something in the nature of a statistical survey, that would furnish accurate and detailed information on these points. In order that the information gathered might be general, and not local, in its teachings, districts in three sections of the State were covered, viz.: in Mannington township, Salem county, in Mercer county, near Pennington, and in Sussex county, covering that section about Branchville and Augusta. A series of thirty-eight questions were prepared, covering practically every phase of the business, and which were so worded as to require in most cases more than "yes" or "no" for an answer. These questions covered the character of the soil and method of farming, the breed of the animals, and method of obtaining them, the character of food, of both summer and winter; whether the animals were pastured or soiled, in whole or in part, or whether fed succulent or dry food during winter, whether records of yields were kept, and concerning methods of selling milk, and use of wastes and by-products. The final question was: Is the dairy business profitable? This was, of course, a leading one, but the object of it was to obtain the farmer's point of view, and to learn if the cause of the success or failure could be determined from the answers to the other questions. In short, the whole purpose of this work was to not only secure facts in reference to the business as now conducted, but to get such detailed information concerning methods as would furnish a basis for suggestions

for improvements, if such were deemed necessary after a careful study of the data obtained. It is, however, rather unfortunate that the data obtained in these inquiries were turned over to me for study, classification and presentation here, although there is no one question that is of greater interest to me at the present time, nor one that is receiving more attention by the Station, than the question of improvement in our dairy methods. It is unfortunate, because with my other and fixed duties, I have not been able to give the work the study which in my judgment its importance demands. Nevertheless, from such suggestions as are furnished by such study of the data as I have been able to make, I have prepared this paper, which contains such comments upon present methods and such advice concerning methods of improvement as seem warranted by the facts.

I may say, in the first place, that on the whole, the statistics reveal a very satisfactory condition, particularly in reference to methods of winter feeding and care of animals, and many serious faults in reference to records of yields and methods of sale; it must be remembered, too, that in the sections covered by the inquiry, the dairy business was probably conducted in a better way than would be shown if the entire State were covered. A few general statistics will perhaps be of interest:

The number of dairymen included in the Salem county district was 107; in Mercer, 51, and in Sussex, 31. The average size of farm in Salem county was 127 acres; the average number of cows kept is 16, and the number of acres per cow, therefore, about 8. The average size of farm in Mercer county was 106 acres, the average number of cows kept is 21, and the number of acres per cow, 5. In Sussex county the average size of farm is 162 acres, the average number of cows, 31, and the average number of acres per cow, 5.

In Salem county the herds were practically all grades of Guernseys, Jerseys or Holsteins. In Mercer county 34 herds are reported as common stock, 9 as Jersey or Guernsey grades, and 3 as pure-bred. In Sussex county the animals are in large part Holstein pure-breds or grades. In fact, of the entire number reported, 6 are pure-bred Holsteins, 18 Holstein grades, 5 natives and the balance Jersey or Guernsey grades.

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With very few exceptions, the animals are pastured exclusively in summer, the areas required ranging in Salem county from 1 to 2 acres, or an average of 1.25 per cow. In Mercer the pasture required ranges from 1½ to 3, an average of 2 acres, and in Sussex county from 1 to 3½, an average of 2½ per cow. A gradual increase in area of pasture required per cow from the richer and more completely cleared lands of South Jersey to the more mountainous conditions of North Jersey. In only four cases are protein crops grown for supplementing pastures, though many report corn for this purpose.

In Salem county all raise some cows at an average cost of \$25 each at two years of age. All buy more or less, at an average of \$40 to \$60, and sell wornout cows at an average of about \$40. In Mercer county 55 per cent. of the entire number raise their own cows, at an average cost of \$29 each. The average cost of animals purchased is \$48, and the average price received for dry cows is \$21. In Sussex county but 1 reports buying all his cows, 20 report raising all their cows, and the balance buy. In Sussex county the cost of raising pure-breds is ranged from \$40 to \$65, an average of \$52.50, and of raising common stock from \$20 to \$30, an average of \$25, and the average price received for old cows ranging from \$15 to \$25, an average of \$20, and the price paid for new cows ranges from \$30 to \$60, or an average of \$45.

Of the 189 farmers, but 23, or 12 per cent., report having silos. Among the remainder, a few report feeding wet brewers' grains, but practically all use dry fodders, cornstalks and hay, as the basis of winter roughage. In most cases the fine feeds purchased for supplementing home-grown products belong to the protein class, indicating an understanding of the importance of balanced rations. Of the entire number, 189, 4 report the keeping of accurate records of the yields of individual animals, though many report what they believe to be the average of the herd, and but 4 have a definite knowledge as to the composition, or fat content, of the milk. These may be regarded as the most serious weaknesses in present methods of practice. In reference to the point of profit, 39 of the 51 farmers in Mercer county report the business as profitable, and 19 of the 31 in Sussex county report it as profitable, 2 report the business as unprofitable, and the remainder

of the number modify their answers to this question. It is unfortunate that in the inquiries made in Salem county, detailed answers to all the questions were not given; the résumé furnished, however, is interesting as showing the general character of the dairying, though not enabling a close study of the features which are important in order to suggest improvements.

For example, the agent securing the statistics in Salem county presents the following summary: "One hundred and six dairy-men keep and milk from 10 to 50 cows apiece; 30 dairymen wholesale their milk to creameries at 2 to 2½ cents per quart; 76 wholesale and ship to Philadelphia and seaside resorts, at 4½, or 4 cents net. Winter feeds consist of 8 to 12 quarts per cow per day of corn meal, bran and gluten, supplemented with corn fodder and upland hay or ensilage; pasture in summer, supplemented with soiling corn and about half the quantity of grain fed in winter. Stock all stabled in winter, and mostly exercised in warm yards daily. All cool milk with areometers for shipping.

Average daily production per cow is estimated at 7 quarts dry measure for each of the 1,216 cows kept in 76 dairies, which, sold at 4 cents per quart, equals an average of \$102.20 per cow per year, besides calves and milk for home use. This, less the difference between cattle purchased and sold, leaves a net return of \$82.20 per cow, an excellent showing, provided the estimated yield is correct. Many improve their daily average yield by continuously buying and substituting fresh for those nearly milked out. Those who feed most heavily and have their cows in high condition claim the above plan pays better than retaining the same cows from year to year.

All agree that they can only successfully compete in producing milk in these days through the adoption of the improved methods of feeding and care recommended by the farmers' institutes, and that even then the constantly increasing price of labor and special feeds they must procure leave them a constantly decreasing margin for profit, though their lands are being generally improved in fertility.

All agree that express rates for conveying milk are too high, and all agree that it is no longer possible to produce milk by old methods without loss.

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There are usually kept about 20 per cent. as many young animals and dry cows on each farm as of cows in milking.

STATISTICS OF INCOME.

20 dairies of about 300 cows, fat calves, amounting per year, at \$40 per cow, to	\$12,000 00
30 dairies of about 450 cows, yield about 1,000,000 quarts of milk sold to creameries at 2 cents per quart,	20,000 00
76 dairies of about 1216 cows, yield about 3,100,000 quarts of milk, shipped at 4 cents net,	124,000 00
Total annual value of milk and veal in township,.....	\$156,000 00

This summary is interesting and valuable, but its incompleteness and lack of definiteness are more apparent when compared with a complete and definite statement covering answers to all of the questions. The following has been selected as representing the best conditions:

The farm of 150 acres is located on limestone soil. The dairy consists of from 35 to 40 cows, together with young stock, largely pure-bred Holsteins, and all cattle are raised. The stock is pastured in summer to a small extent, though pastures are supplemented with oat and pea and corn forage, as well as small quantities, as found necessary, of protein feed mixtures, made up of wheat bran, malt sprouts, oil meal and gluten meal. Silos sufficient to carry the herd through the winter and provide some summer feed, are maintained, and the winter forage consists of silage and clover and mixed hay, together with the feeds already mentioned, in proper amounts. The animals are stalled in winter and exercised in fair weather. Absorbents are used in the stables to prevent the contamination of the milk; animals are well bedded with shavings and straw. Records are kept of the daily yield of all animals, and the average for mature cows is 9,000 pounds per year, and the product averages 3.5 per cent. fat. This milk is wholesaled at a skimming station in the neighborhood, and the prices received are New York Exchange prices for six months, and for six months the New York Exchange prices less one-quarter of a cent per quart, an average of $2\frac{1}{2}$ cents, or \$103.20 per cow. The manure is carried to the field when pos-

sible as soon as made, applied to corn ground for spring-seeded forage crops, and as top-dressings for grass. The dairy business is profitable.

This dairyman is successful, and may well stand as a type of what a good dairyman ought to be; he knows positively what he is doing, and, further, he knows the importance of keeping the best breed for his particular purpose, viz.: for supplying milk on the quart basis for direct consumption, as milk; he knows that these animals, cow machines, should be supplied at all times with all they need of the raw materials for the manufacture of milk, hence provides for supplementing the pastures with proper forage crops. He knows that the cheapest and best food for his purpose is that obtained on his own farm, and grows catch crops for supplying the important element, protein, as well as to protect his soils from losses. He knows the advantage of providing as nearly as may be June conditions in winter, and hence silos are provided for the storage of corn, and because of the succulence of the ration the milk flow is maintained. He knows that it costs practically as much to maintain a cow, whether she gives a small or large flow of milk, and hence keeps records of individual animals, discards the boarders and keeps only those that reach a standard yield. He has learned by a careful study of experimental data, that it costs more to produce milk from butter breeds than from milk breeds, and, as his business is to produce milk, keeps that breed which gives him the largest yield of milk per unit of cost. He has studied the principles involved in the manufacture of milk from crude farm products, and knows that the wastes of manufacture contain a large proportion of the constituents of fertility, and that these are quite as useful for growing crops as those purchased in concentrated forms, and hence handles them in such a manner as to prevent loss, and uses them in such a way as to cause the largest return in crops of most use to him.

The suggestions for improvement that are apparent from a careful study of all of the data offered, and that are hinted at in this description of good dairy practice, are as follows:

First, that pasture is not a sufficient summer food, even under

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best conditions, hence forage crops should be more largely grown to supplement summer pastures.

Second, that these should consist more largely of protein crops, which may also serve as cover crops.

Third, that the use of silo reduces the cost per quart of milk, and should be more generally adopted.

Fourth, that the cost of maintaining a cow is practically identical, whether her flow is large or small, hence records of yields of individual animals should be kept.

Fifth, that the cost per quart of milk is measured to some extent by its composition, hence the kind produced should be adjusted to meet the requirements at the lowest cost.

Sixth, that the largest proportion of the fertility constituents are contained in the wastes of manufacture, hence great care should be exercised in handling and using the by-product, manure.

First, That Pasture is Not a Sufficient Food, Even Under Best Conditions, Hence Forage Crops Should be More Largely Grown to Supplement Summer Pastures.

It has been shown by a study of the data already referred to that on the whole dairymen require something over two acres of land to provide the pasture for one animal for the summer season. It is also shown that very few grow supplementary foods. Any dairyman knows that in our uncertain climate there are many periods in summer when even the best of pastures are not sufficient to supply the entire needs of the animals for roughage. We have late springs, wet spells and dry spells, all of which interfere with our plans and prevent the animals from securing a sufficient amount of food, and when these periods are not provided for by dairymen, there is not only a shrinkage in milk flow, but the animals are reduced in flesh and vigor, and it is not easy to again bring up the flow to its normal, even with a full supply later. Data are not available to enable an exact estimate of the losses that are incurred through this lack of proper food at all times. It has been shown, however, that animals do shrink at

least one-half for short periods of time, and the attendant expense to bring the animals back must cause a very material increase in the cost of milk, because of the reduction in the annual yield.

A few suggestions from experimental data, it seems to me, would be helpful at this point. It has been shown by the experiments conducted at our station, that it is possible to so adjust the various forage crops as to permit of a full supply of food throughout the entire growing season, or from May 1st to November 1st, and this without regard to the character of the season. There are many reasons why farmers have not adopted this rule of practice, the chief one being that they do not appreciate the value of a number of crops now grown for this purpose. Take, for example, rye, which is one of the earliest of our forage crops, and is for the purpose of supplementing early pastures, and for preventing a too close pasturage early in the season, one of the best; its value has not been fully appreciated, because of the tendency on the part of farmers to allow it to advance too far in the period of maturity before beginning to feed. If seeded in the right way and cut at the right time, it is palatable and digestible, and provides in all respects an excellent food. The crop should be seeded early (not later than September 1st), and well manured, in order that a large top may be obtained, in which is stored up food accumulated in the fall, which will cause a rapid development in spring. Under such conditions, it can be used in our State at least as early as May 1st, and continued for from eight to ten days. Successive seedings have enabled us to feed it successfully for twenty days. This will carry the supplementary feed over until wheat is ready, which is even better than rye, as its period of usefulness is longer.

These two crops will guarantee against any lack of succulent food during the season, when the pasturage is at best uncertain; following these oats, or oats and peas, will be found advantageous, and if not needed may be made into hay.

Another crop which is very advantageous for summer feeding, and which, seeded after rye, will not interfere with regular rotations, and come earlier than corn, is barnyard millet. This is

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another crop which is not understood as it should be, but which serves an excellent purpose when properly seeded and cut at the right time. Its best use is before it is fully headed out, and the first cutting should, therefore, be made as soon as the heads begin to appear. Following millet, corn may be used, and among the varieties best suited for supplementary feeding with pasture is the Thoroughbred White Flint, first, because it is a rapid grower, and will be ready for feeding, if planted early, by the middle or latter part of July; and second, because it stools largely, and does not make a coarse, heavy stalk, thus permitting of its entire consumption by the cattle. Of these crops the rye and wheat may be pastured if convenient to do so; it is less expensive, but much more wasteful than if carried to the animals. The millet, of course, if not needed for green forage, may be made into hay, and the corn used in the regular way.

Second, That These Should Consist More Largely of Protein Crops, Which May Also Serve as Cover Crops.

Recent studies have also developed a number of crops useful for this purpose, which are of a different character than those mentioned; they are richer in that element protein, so important in any ration and necessary for the proper utilization of our other crops.

This group of crops includes those plants which belong to the legume or clover family, and which do not depend solely upon soil sources for their nitrogen, but can obtain it from the air, hence the further advantage in their growth and removal from the soil; they do not materially reduce the content of soil nitrogen, but rather add to the crop-producing capacity of soils by improving their physical character and by increasing their store of nitrogen. The plants of this group are often called, and properly, "nitrogen-gathering" crops, and their renovating and improving character are seldom overestimated.

Fortunately, because of the number of plants belonging to this group, and because of their wide range of adaptation to the various conditions, it is possible to introduce one or more of them

into the regular system of farm practice, without interfering with useful and profitable rotations. Many of them, for example, the various clovers, red, crimson and alsike, are already grown extensively, and their value in the rotation well understood by practical men. There are many others, however, whose characteristics of growth and adaptability to the various conditions have not been carefully studied until recent years, and whose usefulness, therefore, is just beginning to be appreciated. Among these are the Canada field pea, the soy bean, the cow pea and the various varieties of vetch, all possessing that valuable power of appropriating for their use the free nitrogen of the air, and thus contributing directly to the potential fertility of the soil.

Another crop belonging to this class, which is yet in its experimental stage in this State, is even more valuable than any yet mentioned, namely, alfalfa. For a dairy farm there is no plant that is so promising, first, because of its high feeding value; second, because of its rapid growth, and consequent large yield; and third, because it is a perennial, and may be harvested from year to year without expense of reseeding or of cultivation. The experiments thus far conducted seem to point to the fact that this crop can be grown wherever good corn can be grown. That is, on soils naturally well drained and reasonably fertile. The chief difficulty at present is to secure a good stand. If seeded in spring, the difficulty in getting a stand is due to the growth of weeds, especially in August, when crab grass is usually so abundant. It would appear that fall seedings are, therefore, to be recommended, because if for any reason there is a failure, there is no loss of the land, as it may be reseeded again in spring or planted with other crops. One very important point to be remembered in the growing of this crop, is that the soil should be well prepared, limed and liberally fertilized with the minerals, phosphoric acid and potash. The experiments conducted at the station show that the average cost per ton of dry hay, for five years, even with heavy manuring, was but \$5.26 per ton, and that the feed value of this hay compares favorably with the protein feeds, which at present prices cost \$20 or more per ton. This crop, more than any other, fulfills that very important requirement of all dairy farmers, a

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cheap source of protein for balancing other home-grown rations. Its growth by dairymen cannot be too strongly recommended. An ideal dairy situation would be where the farm is growing corn and alfalfa, to supply the entire needs of the dairy.

The introduction of nitrogen-gathering crops has, too, a greater significance for the man who manufactures milk or any other form of animal product than for the grain farmer, because the selling or market price of the grain or hay crop is not enhanced by virtue of its containing a larger amount of nitrogen, while it does increase feeding value, as the nitrogen is the basis of the protein of his ration, the substance which is usually deficient when only the regular farm crops are used, and if without home supplies must be purchased.

Third, That the Use of the Silo Reduces the Cost per Quart of Milk and Should be More Generally Adopted.

The statistics show, as already stated, that out of the 189 dairymen, but 23, or 12 per cent., use silos for preserving forage for winter feeding. That this should be the case among the leading dairymen of the State is a matter not readily understood, for there has been no one other question connected with the dairy that has been urged so strongly as the importance of providing succulent foods in winter. It may be accounted for in part by the fact that it is possible in winter to obtain wet brewers' grains at reasonable prices, and thus provide a succulent ration of excellent quality, and accomplishing the one purpose of the silo. Still, this can only be a partial exception, and where such food is available, it does not militate against the use of silos for the proper preservation of corn, which is a home-grown food. The progress that has been made in the making of silage is such as to make its importance much greater than in the earlier history of its use, for along with the knowledge that has been gained in recent years concerning the great value of corn, much progress has been made in the development of varieties, in growing the crop, in order to secure the greatest yield of digestible food, and in the methods of handling it in order to prevent mechanical and

chemical losses. It was formerly supposed that for forage purposes, in order to secure the greatest feeding value from the crop, it should be planted thickly, and should be harvested early, or before the crop had approached maturity. It has been demonstrated, however, that the yield of digestible dry matter per acre will be much greater when it is seeded thin enough to permit the growth of ears on a large proportion of the plants, and harvested after the ears have reached the glazing stage, or maturity, than if it is planted so thickly as to prevent earing, and is harvested before the crop is mature. While it has not been shown that to put the corn into the silo is the best method under all circumstances, I think it has been clearly proven to be the best method for all dairymen, that is, of those who milk a sufficient number of animals to be regarded as dairymen. Its use as a means of storage and preservation will result in a great saving of feed and a proportionate reduction in the cost of producing milk.

The results of experiments conducted at our own station show :

1. That the cost of harvesting, storing and preparing the dry matter contained in corn was but slightly greater in the form of silage than in the form of dried fodder.

2. That the changes that occur in the composition of silage were not such as to decrease its feeding value in a greater degree than those which occur in the process of curing corn fodder.

3. That for milk and butter production the feed value of the dry matter of the silage was greater than that of the dried fodder corn. The yield of milk was 12.8 per cent. greater, and the yield of fat 10.4 per cent. greater.

4. At $3\frac{1}{2}$ cents per quart for the milk produced, the value of the corn crop was more than \$15 per acre greater when fed in the form of silage rather than in the form of dried fodder.

Applying the results of this experiment in a practical way in the dairy, it was shown that at \$1.50 per hundred, or less than $3\frac{1}{2}$ cents per quart, the gain would be \$15 per acre, or a saving for a dairy of 25 cows, that would require about eight acres of silage, \$120 per year, or half enough saved in one year to build a silo large enough to supply the herd. At the Experiment Station a silo was built in 1896, with a capacity of 150 tons, for

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\$320. This silo has not cost anything for repairs up to the present time, and yet on the basis of the experiment, and the results reported in the experiment I am sure are conservative, the additional value of the corn stored in the silo, rather than used in the ordinary way, assuming but \$1.50 per hundred for milk, has been practically \$1,600 for the seven years. Surely a very profitable investment, and one which no dairyman should ignore. One other important argument in favor of the silo is that no dairyman, after once using one, abandons its use.

Fourth, That the Cost of Maintaining a Cow is Practically Identical, Whether Her Flow is Large or Small, Hence Records of Yields of Individual Animals Should be Kept.

It was shown that but four farmers of the entire number reported the keeping of accurate records of yields of individual cows. This, in my judgment, is a matter that is open to the gravest criticism, as there is no other one thing so important as to know what individual animals are doing.

We have abundant evidence that the chief factor, a very important one, when other points are looked after in a scientific and a practical way, is the machine used to convert the food grown or purchased, that is, raw materials, into finished product. Great progress has undoubtedly been made in the past twenty-five years in the development and improvement of this machine, the dairy cow. We have been breeding animals for the special purpose of use in the dairy, and we have now many good breeds from which to select, still owing to the fact that true principles have not always been the guide in this development of the breeds, we still have many animals, even among pure-bred, that are not profitable machines for the dairy. In the study of this question, it has been shown conclusively that it is not so much a question of breed as it is a question of individual, and that it is possible to select individuals from any definite breed, or even from mixed breeds, which are superior to others in their power to convert the raw material, food, into the manufactured product, milk, at a profit, and that an animal that makes a high record in any year, while

she may vary in her product from year to year, is never a poor animal, unless something out of the ordinary happens to her. Thus, the dairyman should be quite as careful to select his cow as he is in selecting his soil, or the manures for use upon it, or the crops to grow; in fact, it seems to me that it is even more important, because of the waste of intelligently acquired energy that may be caused by the keeping of poor cows. In our own herd of 35 cows we have a range in production from less than 4,000 pounds of milk to over 12,500 pounds in a year. Yet the amount of raw material used in the case of the animal giving 4,000 pounds was practically identical with that used by the animal giving 12,500 pounds. From the standpoint of simply milk-making, the one machine was over three times as valuable as the other, as the labor involved was practically identical. The cow should produce at least 5,000 pounds of average product, say of 4 per cent., for at present prices of feeds the average cow will consume food worth from \$45 to \$50 per year, if well fed, and the 5,000-pound cow will, at \$1 per hundred for milk, practically pay for the feed, and give her manure and her society as a profit. Whereas, the 6,000-pound cow will make us a profit of \$10, the 7,000 cow a profit of \$20, and so on, and I have yet to find a dairy with an average of 7,000 pounds per cow, and which can be obtained by proper selection of animals, which has not proved a money-making proposition. The questions naturally arise, How shall these animals be obtained, and is it necessary to have the pure breeds, or are high-grade animals necessary, in order to reach this desirable limit of milk production? In 1896 a study was begun at the Experiment Station to determine whether it was possible, and practicable, to obtain animals of this standard by means of raising calves from the best-grade cows, crossed with pure-bred bulls. Thus far, and the experiment is but fairly begun, we have in the herd one-half dozen heifers, none of which is more than seven years of age, and with a third calf, and the results thus far secured are exceedingly interesting.

For example, Sebolt's Daisy, in her first period of lactation, produced 4,396 pounds of milk, with an equivalent of 282 pounds of butter; in her second period of lactation she produced 6,701

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pounds of milk, or 420 pounds of butter; and in her third period of lactation she produced 5,853 pounds of milk, or 352 pounds of butter. Queen's Ideal in her first period of lactation produced 7,647 pounds of milk, equivalent to 406 pounds of butter. In her second period of lactation she produced 6,664 pounds of milk, equivalent to 344 pounds of butter; in her third period of lactation she produced 7,520 pounds of milk, equivalent to 362 pounds of butter. Queen's Beauty in her first period of lactation produced 4,595 pounds of milk, or equivalent to 266 pounds of butter; in her second period, with one month yet to run, she has produced 6,334 pounds of milk, or equivalent to 360 pounds of butter. Model's Prospect in her first period of lactation produced 4,283 pounds of milk, or equivalent to 259 pounds of butter. The principle of breeding is right, but the test must be used in order to prove the value of the individuals.

Any one of these, either from the milk or butter standpoint, have paid a handsome profit, and no one of them has yet reached the age of maximum production. Furthermore, the cost of these heifers, up to the time when they more than paid their way, was less than it cost to purchase animals in the open market, an average of \$50 per head, many of which did produce less than the amounts here recorded as the yield of the heifers raised. It is important, therefore, from the standpoint of profit in the dairy, first, to select with great care good foundation stock, and then breed them to a pure-bred sire of the breed that will contribute those qualities which are desired to meet the purpose, in order to build up the yield or quality and consequent profit of the herd. As a rule, the animals which are for sale, and which constitute a large proportion of those in our milk dairies, are not those which have given satisfactory results in the dairy in which they have been raised. It is possible for any dairyman to raise better stock than he can purchase, if he will but take the pains to do so, and a much larger proportion should do so if right progress is to be made.

Fifth, That the Cost per Quart of Milk is Measured to Some Extent by Its Composition, Hence the Kind Produced Should be Adjusted to Meet the Requirements at the Lowest Cost.

In the statistics obtained from the various dairymen, there were but few instances where the composition of the milk was known, and yet the product was sold on the quart basis. This, in my judgment, is a very weak point in our dairy business. Practically all of the milk sold was delivered for direct consumption, rather than to creameries. If any one thing has been firmly established by scientific investigation, it is that the value of any food product from the nutritive standpoint is measured, first, by the total content of nutrients, and second, by the amount and proportion of the different classes, viz., fats, proteids and carbohydrates contained in it, and the further fact, which is corollary to the first, that the cost of production of milk is influenced, first, by the amount of actual solids, total nutrients, contained in the milk, and second, by its composition in reference to the different classes of nutrients, and that in proportion as the solids increase, or as the fat increases in the solids in that proportion, as a rule, will the cost be increased. It has been shown by a study of dairy breeds, that they fall into two distinct classes, the first including the Ayrshires, Holstein-Friesians and Shorthorns, as leading representatives, and known as milk breeds. That is, animals which naturally produce large quantities of milk of an average quality, at a lower cost per quart; second, a class including Jerseys and Guernseys, as leading representatives, which produce a small quantity, but show a quality considerably above the average, at a higher cost per quart. The average composition of the milk of the first class would show, in round numbers, 12.50 per cent. total solids, and 3.50 per cent. fat, whereas the average composition of the milk of the second class would show, in round numbers, 14.50 per cent. total solids, and 5 per cent. fat. Or, in other words, the milk from the second class contains 16 per cent. more of total solids, and 43 per cent. more fat, than that of the first. Hence, where no distinction is made between the quality of the milk on the part of the consumer, and the quart basis serves as the method of sale, then it is quite evident that those dairymen who produce milk from animals of the first class do produce it

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much cheaper than those from the second class, and from a business standpoint it would be unwise to include the animals of the second class in such a dairy.

As a further illustration of the effect of this question of composition of the products which may be obtained in the dairy, or of the inequalities which exist, and thus the disadvantage under which the dairymen who produce the richer milk labor, I cite the results of an investigation made by the Experiment Station in 1896. It was found in this examination that the milk, as produced and delivered for direct consumption, fell into eight distinct classes, the first showing less than 3.00 per cent. of fat, with the accompanying solids, not fat; the second, from 3.00 to 3.50 per cent. of fat; the third, those from 3.50 to 4.00 per cent.; the fourth, those from 4.00 to 4.50 per cent.; the fifth, those from 4.50 to 5.00 per cent.; the sixth, those from 5.00 to 5.50 per cent.; the seventh, those from 5.50 to 6.00 per cent., and the eighth, those containing over 6.00 per cent. of fat.

The fact that milk falls into these various classes in respect to fat content, shows that at the same price per quart there is a wide variation in the prices received for the nutrients by the producer, or assuming that the quality of the nutrients, as represented by the "total solids," is quite as good in one class of samples as in another, the price received per pound of "total solids" in class one, at the rate of 4 cents per quart, is 17.5 cents, while in the eighth class it is 13 cents, or 35 per cent. greater in class one than in class eight. On the quart basis, the milk of the first class would bring as much as that of the eighth, yet the value of that of the eighth would be 35 per cent. greater from the food standpoint, and should bring the producer that much more, even though the cost was not in the same proportion. From the consumer's standpoint, too, this is an important matter, for \$100 spent for milk of the quality represented by the eighth class would purchase nutriment that would cost \$138.50, if purchased in the form of milk of the quality represented by class one. It is an important matter to select animals for the dairy that will provide what the market demands at the lowest cost per quart, so long as the quart is the unit of value.

Sixth, That the Largest Proportion of the Fertility Constituents are Contained in the Wastes of Manufacture, Hence Great Care Should be Exercised in Handling and Using the By-product, Manure.

The records kept at the College Farm, as to the amount of manure annually produced, show that the average weight of solid and liquid manure, unmixed with litter, amounts to 70 pounds per day, or an equivalent of 12.78 tons per cow per year, the cows ranging in weight from 850 to 1,500 pounds, an average of about 1,000, and that this solid and liquid, combined, contained on an average:

Nitrogen,	0.457	%
Phosphoric acid,	0.300	"
Potash,	0.348	"

There would be contained, therefore, in the manure made in one year by a well-fed cow, 117 pounds of nitrogen, 77 pounds of phosphoric acid and 89 pounds of potash. These constituents are equivalent in amount to what is contained in 731 pounds of nitrate of soda, 550 pounds of acid phosphate and 178 pounds of muriate of potash. Further experiments showed that this amount of manure, if exposed, that is, left alone, out of doors, for an average of 82 days, during winter and spring months, would lose 60 pounds of nitrogen, 39 of phosphoric acid and 54 of potash, or amounts of constituents equivalent to 380 pounds of nitrate of soda, 277 of acid phosphate and 108 of muriate of potash, or without regard to their agricultural or commercial value, there would have been lost these amounts of essential constituents, which at one time existed in soils and served a good purpose in crop production. If the manure had been handled in the best known manner, a part of the nitrogen contained might have been lost, because of the tendency to fermentation, resulting in the escape of ammonia, but the mineral constituents could have suffered no loss, without exposure to conditions, which permit leaching. That preventable wastes of the constituents of manures do constantly occur, is abundantly evident from these statistics,

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for in many cases the manures are allowed to lie in the open yard, often in loose heaps, which favor fermentation, and subjected to the leaching from every rain that falls. These conditions must result in great loss to the farmer, and the probabilities are that the amounts annually disappearing in this way are as great, if not greater, than is shown by these experimental figures.

It is difficult to affix a value to these constituents, since it is manifestly unfair to apply the same commercial values to the constituents contained in yard manure as are affixed by the laws of trade to the constituents in commercial fertilizers, because commercially the conditions are different; yet it is fair to assume that if the constituents lost were replaced by those from regular commercial sources, it would cost exactly what commercial relations fix for them. The kinds and amounts of the commercial products, which would contain constituents equivalent to those lost, would cost at the present time, at wholesale, \$12.50. If they were purchased in the form of city manure, at prices at which the product is delivered at consumers' depots, viz., \$2 per ton, they would cost \$11.50, or but slightly less than if purchased in the commercial forms, though at a much greater expense for labor. From either source the amount liable to be carried away from the by-product of but one cow for one year, when unduly exposed, represents a considerable financial outlay if the loss is to be made good by purchased supplies. On the basis of the cost of constituents in commercial fertilizers, it is equivalent to 25 cents per hundred for the milk of a 5,000-pound cow, and 23 cents per hundred on a basis of the cost of city manure. That is, if the fertility of the farm so lost was made good by the purchase of commercial fertilizer, or of city manure, then the cost of production per hundred of milk would be increased by these amounts, and conversely, if the losses were prevented, and the outlay not required, the cost per hundred of milk would be decreased by 25 and 23 cents, respectively. We sometimes hear farmers complain that the dairy business does not pay, the price they receive for their milk is too low; besides, their farms are rapidly impoverished by the constant drain upon the fertility by the milk sold. Yet, these farmers will drain the overflow from their barnyards, into roadsides or streams, and carry fertility

there to grow weeds or feed the fishes, which in the waste from one cow in one year is equivalent in nitrogen to that contained in 5.66 tons of milk, in phosphoric acid to that contained in 10 tons, and in potash to that contained in 15 tons of milk. The impoverishment of soil is not due to the dairy business, as such, so much as it is to the management of the business.

The degree of exhaustion that is effected, or the rate of improvement of soil that may be obtained by means of the dairy, is measured by the care used in the handling of the manures, which contain nearly four-fifths of the total constituents removed by the crops, and when it is possible for so large a proportion of the constituents contained in these to be carried to the wrong place, or, in other words, lost so far as the farmer is concerned, unless care is exercised the improvement of soil from dairy farming is much reduced.

The actual loss of constituents, however, is not the whole story, since the removal of a part of the constituents of manure has a bearing upon the increase in crop that will be caused by the use of the manures remaining. That is, because the soluble constituents, and therefore the more available, are carried away, the increase in crop that may be expected from the application of the same amount of constituents would be much less from the leached than from the fresh manures. Experiments conducted by our own Station, with leached and fresh manures, on oats, corn and millet, show that the nitrogen contained in the fresh manure, total product, was much more effective in increasing the crop than that which remained after the manures had been exposed, and partially leached of their soluble constituents. For five crops, two oats, two corn, and one millet, it was shown that the gain in yield from a unit of nitrogen in the form of fresh manure, solid and liquid, combined, was 83.4 per cent., while the gain in yield per unit of nitrogen of the same product, leached, was 47.7 per cent., or that one ton of the fresh manure, unleached, containing the same number of pounds of nitrogen as one ton of the leached, was equivalent in crop-producing power to 1.75 tons of the leached manure, or that one pound of nitrogen in the fresh product was worth as much as one and three-quarter pounds of the leached. The loss of active fertility may, therefore, so far as

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the nitrogen is concerned, be nearly one-half on the basis of total amount and nearly three-fifths on the basis of availability. Another point of interest shown by the experiments was that the value of the nitrogen in the fresh manure compared very favorably with that in forms generally used in commercial fertilizers.

I am well aware that in the preparation of this paper I have used facts and figures that have been used before, both in my public addresses and printed bulletins. There is not much that is new, except to those who hitherto have not given heed. There is no royal road to successful dairying. To be successful requires thought, study, judgment, patience, observation and work, together with a receptive disposition. Yet we have successful dairymen. Let us, therefore, be hopeful and full of courage for the future of this most important industry of our State, one not alone affecting the prosperity of the farmer, but the health and happiness of families, the strength of the nation, and the future prosperity and progress of the world, for, in the words of our good friend, Van Dreser, "the cow is the Foster Mother of us all."

A Member—I would like to ask a question. Dr. Voorhees omitted one point. He does not advise the best method of management; he said good management; I want to know what that is.

President Voorhees—I think it may be safely stated that the least loss of the constituents occurs when the manure is taken to the field, as nearly as may be, as soon as it is made. We all know it is not always possible to take the manure from the yard, the combined material, and put it on the land at this time, though in so doing loss is prevented, because the fermentation is stopped because of the cooling, and the material in its solid and liquid state furnishes the plant with its food right away. We find it possible to get it out at least once in two weeks; but we do spread it in the winter, and we find we get better returns from applying it to the land in the winter than in allowing it to lie in the yard, because there is a great loss of nitrogen. We know, too, that in keeping manures in large heaps and in dark places, there is a sort of fermentation or bacteriological action, which results in

the direct loss of the nitrogen. So even on that ground it is not well to leave the manure in large heaps in the winter; I prefer to take it out as fast as made, where it is possible to do so. Where you have a large number of stock and have an open yard, which is completely covered, and allow the animals to go out on that and keep it trodden down, the moisture that comes from the manure and consequent packing will be sufficient to prevent fermentation and leaching, and then in the spring put it on the crop most useful to you. There are a large number of farmers who have been in the habit of putting the manure on the wheat crop; by allowing the manure to lie so long through the summer there is great possibility of loss. I think the principle pointed out is a safe one; the common sense of the farmer will do the rest—that is, don't allow it to ferment, if you can help it, and don't allow it to be leached of its best constituents, if you can help it.

Mr. Pancoast—These statistics as to loss, are they given as to manure incorporated with litter, or unincorporated?

President Voorhees—Unincorporated.

A Member—What is meant by “well rotted”?

President Voorhees—Well rotted means to regulate the fermentation, so that it will go on without destruction of product, and thus without loss of constituents. Well rotted manure would be naturally richer in the constituent elements.

A Member—What do you think of hauling out manure on the snow?

President Voorhees—All right, if it is not too deep.

A Member—I would like to ask the professor, in the estimated cost of growing the calf, was it the entire value of the calf itself or only the grain?

President Voorhees—No; the actual cost.

A Member—Has the feeding that you recommend in the report, of clover, and silage or alfalfa and silage, been tested sufficiently to pay?

President Voorhees—It has been tested sufficiently to make us consider it does. We put in so many tons of alfalfa and hay to substitute the mixture of feeds which cost us twice as much, and the result in product of milk was only 4 per cent. less, practically the same.

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A Member—That is the hay and corn silage?

President Voorhees—Yes; and we have fed other home-grown protein foods, and in every case the effect has been entirely good. I don't think I should advise that farmers should put cow peas and other of those protein crops in the silo, because if you make them into hay you can better regulate what the animal gets without giving her too much succulent matter; not that it can't be done, but I don't think it is as practical as the other method.

A Member—Wouldn't it be better to handle well-rotted manure?

President Voorhees—The consensus of opinion is that the less labor you give to manure the better, from the standpoint of profit; that is, you can't afford to put the labor on the manure nowadays and expect to get returns back, except under exceptional conditions. For the ordinary farmer, it would not pay; the cost is not in proportion, there is too much bulk to handle.

Secretary Dye—Let us remember, gentlemen, the main point of this address. It is based on a dairy investigation in New Jersey, not very extensive nor very complete, but in three sections of the State. In it we have much food for thought, and when this report comes to you, look at it and see if we, as dairy-men, can allow some of the conditions therein shown to remain longer in New Jersey. We must know what we are doing in order to insure greatest success.

The Dairy Situation.

BY W. D. HOARD.

The Dairy Situation.

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Mr. President and gentlemen, I was exceedingly interested in President Voorhees' paper. He found four men who were fit for the Kingdom of Heaven out of 189 (laughter)—more than there were in Sodom! New Jersey ought to be encouraged. It reminds me of what I heard an old darkey preacher saying once; he said to his congregation: "If the Lord ever gets you into Heaven, he dun got to tie your legs and frow you there by main force." (Laughter.) I don't know! Progress of the truth is slow; there are more objections in the way, more lions in the way, than there are Christians; and it seems as though the domination of the truth, simple truth, had to make its way against an innumerable amount of objections. And don't you think that as farmers we get into the habit that may be illustrated by this little anecdote? Judge Conger, of my State, was a cranky old fellow, and stood—while he was not a Whig—as member for Congress from a Whig district in New York. He said sometimes he didn't vote with the Whigs, sometimes he voted with the Democrats, and he voted generally "No." Whereupon, Dr. Robinson, a strict party man, said to him: "Why, you are opposed to a blamed sight more than you are in favor of." (Laughter.) Now, we get into that frame of mind; we are opposed to more than we are in favor of. Why, there was no living chance on earth for improvement, for progress, in that state of mind. A man has to have faith, he has to have enthusiasm, he has to believe more than he disbelieves. I know there are a lot of people who take on very wise airs and talk about the exceeding wisdom of conservatism. Conservatism is all right. It is right enough to be analytical. But when I find one hundred men objecting to

the silo because of what they don't know about it, to one objecting because of what he does know about it, it does not add very much to my judgment of that sort of conservatism. Now, the conservatism of wisdom is one thing, and the conservatism of ignorance is another thing. The conservatism of ignorance shuns the light; the conservatism of wisdom asks for more light.

Now, I am going to talk to you to-day upon another range of ideas; I am going to try and say something to you along the lines of the general situation. Maybe I will be brought up, I don't know where.

I have studied this dairy question in every State in the Union but one, and that is Florida; I have lectured and spoken upon the subject in every State of the Union except Florida, and in all the provinces of Canada, from Manitoba eastward, except Newfoundland. In all these divisions of territory I have had personal contact with the problem. In addition, I have written to and received letters from many thousands of dairy farmers in all this broad scope of country, as well as in Europe. I have tried hard to dig down to a clear understanding of what constitutes individual success in dairying. I have not been concerned about the creamery or cheese factory. They are not primary or basic. Every dairy State almost, has organized schools to teach the art of butter-making and cheese-making in factories. One hundred and fifty young men come together every winter in Wisconsin and study these things. Teachers and students rack their brains in trying to make good butter and cheese from poor milk that is produced by men who are ignorant of the principles that underlie the art of successful dairy farming. And what is worse, they persist in being ignorant; they do not believe in intelligence; they do not believe that better knowledge, better methods, better ideas, of what they are doing on the dairy farm can be taught. They constantly turn their backs upon every effort to enlighten them.

There is a line of cleavage here between the forces of enlightenment in dairying and the average farmer who keeps cows. What are these forces? I answer: The short course in agricultural colleges; the Dairy School; the Experiment Station Bulletin; the Farmers' Institute; dairy books and papers, and the Agricultural

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Department of the National Government. All these forces work together with wonderful agreement, to do what? To expand the mind of the farmer so he can see better the great underlying truths of his business.

As I have said to you before, Raphael was asked to define Art in a single sentence, and he spent months and years in endeavoring to take that great comprehensive proposition and reduce it to utterance, and finally he evolved this—that Art consists in the ability to see—to see!—and have the mind; to see the picture before it is painted. The making of an axe-helve and the fashioning of Powers' Greek Slave are identical propositions. Both of them statuary! Both of them consist of cutting down and throwing away that which is between us and the clean, true conception of the truth. The man who does not see the axe-helve before he makes it spoils good timber and wastes his time; and if we could only get this proposition into our minds, the idea of definiteness of thought, of establishing a definition which is clear, it would put us under the dominance of that proposition. An old fellow once said about his preacher, "that his head was full of fog, that he didn't know the truth and wouldn't know it if he met it in the middle of the road." That question of Fog! Fog! Fog! Now, men must have, of course, determination; they must have courage; they must have will power; they must have what President Mills said about the Scotch, "a good opinion of ourselves." And that reminds me of the story of a Scotchman who was in England, and he came to an Episcopal church. He had never been in one and thought he would go in. Just as he stepped in the audience were going through the litany and responding "Good Lord, deliver us, Good Lord, deliver us." Sandy stuck his head out as the audience responded "Good Lord, deliver us," and shouted: "The Lord deliver ye! Did ye never see a mon fra Glasgie afore?" (Laughter.) That strong self-conceit, magnificent quality, stubs its toes once in a while. But we are told that "David was a man after God's own heart," but he fell, all the same; but when he tumbled down, he got up again—ready to tumble down again, if necessary. That is what caused him to be a "man of God's own heart," as Carlyle says.

Well, these forces are at work on the mind of the farmer. They believe that this business of farming is a business of cultivated thought, constant reading, trained, intelligent observation; in short, that it is a business of brains first and hands next.

A word on the value of observation—just a moment. I was reared among the Oneida Indians, in New York. My father was a preacher among them, and I learned their language when I was seventeen; I tried to interpret for my father, but it proved very hard on the gospel, and still harder on the Indian. (Laughter.) I let up. But now, as to the value of observation. All the farming of all men on earth lies in the domain of observation. An old Indian told my grandfather who it was that stole his deer—and he never saw the man—but he described him. He said that after shooting the deer, he bent over a sapling and fastened it to it so as to throw it up out of the way of the wolves. He told my grandfather that the man who stole it was a white man, a short man, and that he was lame in his left foot, that he was an old man, and he had a little dog with a short tail, and yet he never saw the man. How did he do it? He knew he was a white man because no Indian would steal a deer; and more, he toed out. In walking an Indian always toes in. He knew he was an old man because he could not carry the deer but a little way before resting, and that he was lame in his right foot because his left made a deeper impression in the snow; and he knew he had a little dog with a short tail because he saw his tracks and where he sat down in the snow. (Laughter.) There is the value of observation. These forces of education believe that farming is a business that calls for educated minds. Minds that put themselves under the dominion of thought and training—not necessarily college-bred minds or school-minds, although it is an aid, but every man must be his own schoolmaster—minds that bring to bear clean and keen intellectual discrimination; minds that are friendly and hospitable to welcome the aid that scientific investigation can bring. It is a grand thing to have a hospitable mind; and yet, there are such a lot of men I meet by the way with inhospitable minds. You can see clearly that all these forces for enlightenment are pushing one way, out into the daylight. They are behind all the improvements in methods, inventions in

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machinery, better laws for the protection of the farmer against organized fraud and greed. In a word, these forces stand for greater intelligence, larger, stronger intellectual understanding of the work so many of us are so blindly doing. These forces believe that this business of farming should be considered an intellectual business; that it should be in the hands of intellectual men; that its elements should be taught in every country district school; that every country boy ought to have a father who believes in these things, who takes pride and honor in being a true farmer and bringing up his sons in a way that shall lead them to be better farmers.

I addressed the boys of the Agricultural College the other day at Burlington, Vermont, a fine class of young men, and I told them that I received every year about one hundred and fifty applications from men of wealth asking me if I could not furnish them with a farm superintendent that had brains and understanding. A man in California wrote me that he had 800 acres of land and 200 Holsteins, and if I would send him a man competent to handle that property he would furnish him with a house and support his family, and pay him \$2,500 a year. I could have sent him ten carloads of young men bred on the farm that were lawyers and doctors, but I could not send him one such man as he wanted.

I tell you that we are in process of inversion. I said every country boy ought to have a father who believes in these things, and that he ought to bring up his sons in a way that shall lead them out to be better farmers, a better farmer than he is. An old German, a very ugly old man, had a very handsome daughter sitting on his lap, and after a while she looked up at him and said: "Papa, did God make you?" "Ya, Ya," replied the old fellow. She thought a while, and then asked again: "And did he make me?" "Ya!" A moment of thoughtfulness, and then: "Papa, God is doing better work than he used to do." (Laughter.) That's the sort of a policy I want to see pursued in these farming districts. I shall never be satisfied, until I see young men coming up on the farms, ambitious to be better farmers than their fathers.

These forces believe that this is the only way to preserve to the country the American farmer and the American farm in a way that they shall be an honor and a glory to the land. These forces believe that all these run down, half worn out, unkempt farms could have been saved to a better condition, to the better profit of the farmer and to the enrichment of the State and nation, had the men, one after another, who have managed them been intelligent well-posted farmers—men who loved knowledge and despised not wisdom.

New York alone in the last forty years, it is estimated, has lost a billion and a half of dollars by the decline of values in her farm lands. New Jersey is not as large a State as New York, but she has lost as much proportionately. It is hard to get a community of farmers to look back and draw lessons from wisdom and experience. The average farmer will declare that his experience bids him to keep right on in the way he has gone. He is opposed to change. Well, what has that spirit brought to you New Jersey farmers? I can tell you what it has brought over in Madison county, New York, where I was a farm hand until I was twenty-one years of age, forty-six years ago. It has brought a decline of seventy per cent. in the value of farm lands. It has brought a loss of fifty per cent. in the fertility of farm lands, so that on a majority of the farms not over half as good crops are grown to-day as were grown forty-six years ago. Clover is not used as a soil renewer; and those old farmers that these young men are following were magnificent old clover farmers. I don't think a finer, brainier, better body of yeomen ever stood on foot than those old New York farmers of fifty years ago. Whence has fled wisdom? Whence has fled the sort of pride and enthusiasm I remember, for instance, thirty years ago! I sow 20 pounds of clover to the acre as a soil improver; it costs \$2.40 an acre. I sow it in the spring and turn it under in the fall; and men come to my farm who say: "Why, Hoard, you can't afford to do these things," and I inquire "Why?" They say: "You can't afford to throw away twenty pounds of clover at 12 cents a pound per acre," and then I ask them: "Can any man manure an acre of land for \$2.40? It is a smart man that can haul out ten loads a day, close to the barn, and spread it; and yet with no extra cost, except

the seed, I sow that land to clover, and plow it under, and get a magnificent crop of corn another year." If it is good for me, why not for you?

It has brought destruction of family fortune, the enforced banishment of sons from the old acres, disgust in the children with the narrowness, the lack of intellectual growth of farm life. All this has brought decay to agriculture. Some of these results could not be helped. The rich lands of the West attracted many thousands of the farmers' sons. But let me tell you that the West would have gone down in the same way, if not as far, in the hands of these American farm-bred men, had it not been that we imported a great mass of better farmers in the persons of the Germans and Scandinavians. This is all that saved the West from repeating the same folly in depleting the soil that was enacted in the East. The farm peasant of Europe had been taught the elements of agriculture in their parish schools. They had been taught not to despise what science could do to give them a faint knowledge, at least, of the soil. They wanted to be farmers. Their sons wanted to be farmers; their daughters wanted to marry farmers' sons. They brought with them a strong, resolute, determined farm spirit. Oh, there is such a difference. We talk about the morale of an army, the *esprit du corps* of an army! Napoleon said almost any army was irresistible if it but had *esprit*—the spirit! And it is true of any class of men. See what effect that had on the preservation of fertility and the price of farm lands in the Middle West. Every farmer's son nearly is looking for a farm to buy. His father is behind him in the purpose. That spirit makes more buyers than there were sellers, and that always enhances the price or value of any article.

In the East the young man did not wish to remain on the farm. You did not import any Germans or Scandinavians to take their place. There was a wasteful system of tillage that depleted fertility, and under the pressure of these two mighty burdens, down has gone the value of farm lands, as I have indicated. In my own county in Wisconsin, where ninety per cent. of the farmers are Germans, the average selling value of farm lands last year was close to \$100 an acre, within a fraction.

To my mind the conviction is as clear as noon-day, that there is only one way to bring up and retain prosperity in American agriculture, and that is by enlarging the mind, the mental grasp of the American farmer.

We hear a great deal said to-day about higher education. It is a humbug. There is no such thing as higher education, but there is such a thing as a wider education, a broader standing of men upon the great pedestal of knowledge, a wider taking-in of facts, a broader comprehension; and that is all there is to education, breath, strength, comprehension, judgment. (Applause.) The American farmer has been content with too little knowledge of what he is about. He has not grasped the business of farming with a clear intellectual understanding. Ninety-five per cent. of the farmers to-day have had no other schooling in their youth than that afforded by the country district school, and right here in New Jersey, and in the West, the country school is not as strong and vital an educational influence for farmers' sons as it was forty years ago. I say it advisedly. To-day the country school all over the United States has not as strong and powerful an educational influence as it had forty years ago. The farming communities have been growing weaker, not stronger, intellectually. The farmer has less sturdy courage politically than he once had. He lies down and submits to political bosses and party and official corruption, in a way that bodes no good to the future of our country. He is paying taxes willingly to enlarge the intellectual grasp and strength of all the schools of the State except his own. ("Hear, Hear!") He has allowed low, unpatriotic ideas of party procedure and official conduct to pervade society, until there is sweeping over the country a mighty wave of corruption. Bribery and the malign influence of "graft" are poisoning the party caucus, the convention, the municipal council, the legislature, the courts, everywhere. Trusts and rich corporations are forcing their way by bribery in all directions. Fifty years ago the farmers of New Jersey would not have submitted for a moment to the political profligacy that rules to-day. It is so here and it is so in the West in many States. Remember, that American liberty is a rope composed of three strands, religious liberty, political liberty, industrial liberty. Become slaves in any one of

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them, and you will soon be enslaved in all three. We have fought for, and won, religious freedom. We are engaged in a fight to-day for the preservation of our political freedom from the corrupt politician and party leader. Great combinations of capital are seeking our commercial and industrial slavery, and their principal tools are the purchasable politician, the political merchant, who obtains the power to sell through the votes of the people he sells.

Does not all this admonish you and me that, as farmers, we must enlarge our mental grasp and strengthen our courage? Does it not speak to us in unmistakable language to the effect that, for the sake of the soil, for the sake of the capital we have invested in our farms and to save it from depreciation; for the sake of a better conduct of our business in order that there shall be more profit, and finally, for the sake of our beloved country, to save it from the conspiracy of dishonest wealth against the commonwealth, we must know more, study more, think more, read more on all these things that relate to our well being?

Organization.—All over the land do we see the forces of society marshalling themselves together for their own good. It is a day of organization. The railroads are banded together, the trusts are organized, manufacturing labor is marshalling itself as a mighty army. The farmer alone is unorganized, scattered, divided. He should wake up to the value and importance of organization. He should first intellectually organize his thought and purpose as a farmer. I want to go back to individual organization, the organized thought, the organized judgment, the effort on his part to bring order out of chaos and establish organized judgment and thought concerning his business. He should organize his farm, correlate and mass its forces, so that it shall present an intelligent front to the purpose he wishes it to serve. Is it a dairy farm? Then make it so in the best sense of the word. Draw upon the latest and best conclusions of modern dairy science, so that the cows shall be dairy cows, the pastures dairy pastures, the barns dairy barns, and all the outward expression of this farm shall show just as clear, distinct a purpose as any manufacturing establishment that has a purpose to serve. I assure you there is no good profit in a half-organized dairy farm. There is no good reward for a dairy farmer with a poorly or-

ganized mind, poorly supplied with dairy information, throwing off poor, inefficient dairy judgments. Shut your eyes to it as you may, modern progress in everything is due to the development of modern brains. If the farmer falls behind, he ought to be able to see the reason of it. Does he see it? Does he admit the truth as it exists? I fear not. I wish to give you one illustration of the power the farmers have over National legislation when they come together.

You are all conversant, no doubt, with the late oleomargarine legislation in Congress. In favor of this counterfeit and fraud, which threatened the existence of the dairy industry, stood the great packing-house trust with its hundred and fifty millions of capital. This trust had tremendous political power in one way. It poured thousands of dollars into the treasuries of the Republican and Democratic National Committees. It controlled the political influence of railroads, for it paid millions of dollars of freight annually. It controlled hundreds of metropolitan newspapers, for it was a fact that scarcely a city newspaper in the land was with us in this fight. In favor of the passage of the law was the National Dairy Union, of which your speaker was President and Charles Y. Knight, of Chicago, Secretary. We appealed to the dairy farmers of the land, and raised about \$30,000. Most of this was spent in obtaining the names of farmers in every congressional district in the United States, and in mailing them postal cards, or in some other way calling upon them to write their congressman and senator to support this legislation. We had to stir up the farmers to make their influence felt on their representatives in Congress. They would not stir themselves. The National and State Granges and other agricultural and dairy organizations did yeoman's service. The great agricultural press lent its mighty voice. We were after the influence of men, and their votes, to oppose the influence of dishonest and greedy capital. We fought the battle through three sessions of Congress, and won it, simply because we represented the organized sentiment and will of the farmers of the United States. We had not money enough to bear our expenses in Washington, and your speaker spent nearly \$1,600 of his own funds in the fight. My friends, there is not an ounce of value in that patriotism that don't cost

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a cent. The instinctive meaning of patriotism is sacrifice; and I care not where a man is in this world if his patriotism does not amount to sacrifice, whether he be on the battlefield or anywhere else, there is no patriotism in him. I speak of this only because I want you to take that definite idea of the meaning of the word. Everywhere outside of the agricultural circles sentiment was against us. The meat trust even prevailed on the union labor organizations in many cities to oppose us, when we were fighting to save the working people from being cheated into paying a butter price for a cheap counterfeit. Such is the influence of money. But the influence of votes, backed by the determination to punish at the ballot-box all treason to these votes, is mightier, if only the farmer will keep his eyes open. It means more to be a farmer to-day, in the light of this twentieth century, than simply to be a soil grubber. It means more. It means as much as the broadest principles of liberty can establish. It means citizenship, it means courage, it means pluck, it means bravery—and oh! so many of us take a cheap, low view and estimate of the position. Well, to resume, here are some of the remarks made to me by various congressmen. "I don't believe in your bill," said one, "but I must vote for it, my farmer constituents are talking pretty plain." Said another: "I never saw such a muss as you have raised among the farmers in my district; of course, I shall vote for the bill. One Virginia member, with over 200,000 inhabitants in his district, avowed his intention of supporting the bill because he had received over one hundred letters demanding that he do so. You can see, therefore, how potent is the influence on the convictions of the representative, of a letter. What did that mean? Attending to one's own business, that's all. Attending to one's own business! Our business is not on the farm alone. The dairy situation covers the whole country; it is down in Congress, it is everywhere. Well, when the bill was before the Senate, leading senators who had declared their intention of voting against it met such a storm of protest that they quailed before it, and gave their votes to the measure. Then it went to President Roosevelt, and the big meat trust, the cotton-seed oil trust, the linseed oil trust, and the National Cattle Growers' Association, and all the railroad and other corporate influences

they could muster, rallied again. But the President was firm, he signed the bill.

Now, all these big monopolies and their tools, the monopoly politicians, are conspiring to prevent Roosevelt from being President of the United States for another four years; and they fought Mr. Cleveland the same way in 1886 for his action. And yet, farmers, with their eyes opened, did not see it!

If the farmers of the land have not brains and courage enough to know their friends and defend them, they deserve to be plundered and robbed, as they will be. These are days when we need more of the old-fashioned courage and patriotism of our ancestors. The key that shall unlock the door to success in dairy farming, in giving the farmer the reward of a larger profit, in making him a stronger master of his fortune, in restoring the wasted fertility of his farm, in giving him larger political influence that he may better defend his rights and interests, in winning a larger respect from other classes in society, is the key of knowledge. The farmer must have a deeper and stronger intellect, a larger hunger and thirst for needed information. He must commence at once to take hold of the common school and make it a force in teaching agriculture to his children, in order that they may acquire a taste and relish for those things that shall hold them to this noble pursuit. He must, for his own sake, stop sneering at so-called "book farming." Did you ever hear lawyers sneer at "book law," or doctors sneer at "book medicine," or engineers at "book engineering"? No! Every vocation in society to-day follows the recorded judgment of the ages. But the farmers, oh! such a lot of them, such a lot of them, sneer at "book farming." Talk with a neighbor over the fence and tell him the truth, and he will believe it. Hand him a little piece of printed matter containing the same thing, and he will reject it! (Applause.) But to resume my subject. The farmer must cultivate a taste for the literature of his calling. Other professions have had to tread this path; other callings have valued a cultivated intellect. The farmer must do the same. When that day comes, then will the American farmer rise to the possession of his rightful place among other classes of men. Then will he fulfill his mission as the guardian of the productive

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power of his country. Then will he be as a man who knows good from evil, in his business as a farmer and as a citizen.

For years I have been especially interested in promoting among the farmers a growth of mental understanding of the problems of dairying as well as agriculture in general. As I view the situation, there is almost overwhelming need of this growth and expansion of the farmer's mind. Where he is weakest is at the point of mental contact with this great business of dairying. His hands are strong enough and hard enough, Heaven knows. There is no lack of hard work, but oh! there is such a lack of clean, clear, intelligent thought to guide labor. As a consequence, the evil spirit of waste, waste, waste, constantly haunts the footsteps of the farmer. If only we could get the farmer to think more, study more, read more, on this question of wasted labor, wasted feed and wasted capital, I am sure we could soon stop this frightful stream of waste that is sapping the heart and hope of the farmer, destroying the stored-up fertility of the soil, and denying to him, his wife and children, the rightful enjoyment and reward that ought to belong to them.

Farming is so constantly conducted from a low plane of intelligence, good judgment and profit, that we wonder how it survives. Yet here and there, at altogether too rare intervals, are men in all branches of farming, who conduct their farms from a high plane of intelligence and judgment, and whose profits compel us to believe that good brain work pays a handsome profit.

Let me give one of hundreds of examples of this character. I have a neighbor, a banker, and president and manager of a large manufacturing concern, doing a business of \$300,000 annually. This man was reared on a New York farm. A few years ago he purchased a farm near my own and proceeded to put it in shape and organize it to do No. 1 dairy work. He is a great reader and student of farm questions. He constantly welcomes the conclusions of science and scientific work. He carries no dull, repellant ears or eyes. He has a farm of 170 acres, well-built barns and cow-stables, and two large silos. He engaged a bright German-American farmer to take the farm on shares of one-half, each owning half the cows and other live

stock, the owner of the farm making all needed improvements. A dairy of 35 grade Guernsey cows are employed, and, as an adjunct, pig and calf-raising are carried on to the fullest extent possible. Four crops are raised for this business. Corn is the main, clover and alfalfa and oats. The constant aim is to have a lot of young growing pigs and cattle about him to consume the surplus skim milk and other by-products, that nothing may be wasted. The business of these cows is butter-making. The investment represents a value of \$18,000. On this investment the gross sales in butter, pork, calves, poultry, eggs, young cattle and old cows for years has run from \$3,600 to \$4,000. Everything on the farm is run from the standpoint of the best plane of thought and judgment. The owner devotes a portion of his thought and splendid business judgment every week to the problem. The lessee of the farm devotes his time to the energetic prosecution of the work of the farm and looking after the many details of planting and harvesting the crops, the care and feeding of the cows and the young stock, swine and poultry, and the milking and making of the butter. He furnishes the labor of men and teams. For this he receives annually an average of \$1,900, besides the support, in the main, of his family. He told me that he annually lays by \$1,000. The owner receives \$1,900 as his interest on a capital investment of \$18,000, less the taxes and repairs. His net return is about 8 per cent. This shows that the farm earns annually a net return at least of 16 per cent. on its capital worth. The owner informs me that his stock in the manufacturing concern returns him 7 per cent net; in his bank the same; and that of the three problems that of the farm is much the simplest and easiest—providing, first, that all the forces of the farm are as intelligently marshalled and organized towards the central purpose as is the factory or bank, and the same intelligent care is taken to guard against waste.

I may be permitted to add that his experience is corroborated by my own with a farm of 193 acres. In my own case I manage the farm, hiring the labor, consisting of a foreman and three other men. The initial point is to organize the farm and all its forces so they will work harmoniously together, to the specific purpose of your farming. Then fence up at every point against any waste

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either of time, or of fertility, or of feed, or of cows. Wasteful cows, wasteful judgment in feeding, all those things, all this great hungry army of waste, feed upon the vital forces of the farm and of the farmer.

Go into our factories, and you will very soon see evidence that intelligent brains have organized them down to every detail for the work in hand. You will see that keen, watchful brains are looking after the smallest waste. If a machine will not work up to its fullest capacity, and that capacity must be one of profit, it is thrown out. You will never hear the manager say, as did a certain farmer to me when I told him if he would sell half his cows—the poorest half—he would have a net profit, whereas now he was working at a loss; his reply was: “Why, what would I have to eat up my fodder?” (Laughter.) Suppose a manufacturer should say the same thing of a machine that was taking his good material and wasting it? Suppose he looked at the question of his method of doing his labor in the same uneconomic way. Where would the manufacturer be in a short time? Well, where do a large portion of the farmers find themselves at the close of the year? Do you believe that the amount of the business intelligence which the farmers have brought to bear upon their task, the amount of brain power, has had anything to do with the outcome? Do they think so? No! If you don’t believe me, ask them if they think their lack of success is due to the fact that they do not understand farming well enough, and see what kind of answer you will get. I know that when I fail it is because I don’t know enough, and every time I fail I find my ignorance is at the bottom of it.

The farmer of the United States has been flattered by the politicians to such an extent that it is hard to make him believe that his lack of success and good profit is due to the fact that he is not well enough educated as a farmer, not well enough trained toward a mental perception of what his business means. He has been paying out taxes like water to develop the intellects of other men’s sons and daughters, to support colleges and universities where lawyers and doctors and other professions shall be ground to a sharp cutting edge. But he cannot see yet the value of knowledge and mental training in his own pursuit or that the minds of his sons need to be enriched and fertilized by good brain work and

scholarship in the study of agriculture. We must stand up and force ourselves to an acknowledgment of the truth.

Old Judge Williams, of Williamsport, Pennsylvania—and this is said to you now for your relief—was one of the most lovable of men, but the old Judge would get drunk—a failing that some very good men have had—and whenever he was drunk he was correspondingly religious, and if there was a religious meeting going on in the town the Judge was sure to be there, spiritually inclined. (Laughter.) One night he was seated on the front seat, and they were holding a revival, and the preacher, in a very impassioned manner, exclaimed in a burst of eloquence: “Show me the drunkard! Show me the drunkard; of all men on God’s green earth the most to be pitied!” Well, to the consternation of everybody, the old Judge rose; he never dodged an issue in his life. He rose, and said: “Well, sir, that’s me!” “What’ll you have?” (Laughter.) The minister was not prepared to realize on his investment quite so quickly. He didn’t know where to put it. A friend finally got hold of the old Judge’s coat tail and pulled him down, and the usual calm was restored, until the minister struck another chord: “Show me the hypocrite! the worst man on earth—despised by all! Show me the hypocrite!” Whereupon the old Judge rose a second time, and reaching his cane over to a certain shaky old deacon, said: “Deacon, why the devil don’t you get up when you are called on? I did.” (Laughter and applause.) I have always, I confess to you, had a secret and deep admiration for the courage and pluck of the old Judge, who not only would face his own faults, but would face those of his neighbors as well.

In Wisconsin we have just started out on a new path in this matter of agricultural education. We have provided by law for the establishment of county agricultural schools, and county training schools where teachers of the country district schools shall be especially trained and instructed in the art of teaching the elements of agriculture to the sons and daughters of farmers. Two counties, Dunn and Marathon, among the newest in the State, have established such schools. By the terms of our law, when once the school is established the State pays three-fourths of the running expenses. These two schools are a magnificent

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success. Last winter the Legislature provided that two more counties might establish such schools. I went before the Board of Supervisors of my county, Jefferson, the fifth richest in the State, and pleaded with them for the establishment of such a school. The scheme was voted down by a two-thirds majority, the members claiming that their farmer constituents were opposed to any outlay for the education of their sons in agriculture. What hope can we have of the elevation of the farmer, or his calling to a higher and more intelligent standing among men, when such are his convictions, such his point of view, and such the effect he has on those he selects to represent him? In this case the Jefferson county farmers were more willing to be taxed yearly for the support of such schools in other counties than to have one of their own, where their sons could have as good a chance for enlightenment as is accorded to farmers' sons elsewhere.

I have given you my ideas of the general situation—why the farmer is not more prosperous for himself, more influential as a citizen, and more prosperous as compared with other classes of society. And this I take to be, in a broad sense, the dairy situation. Exceptions to it are being abundantly multiplied, and they but confirm the affirmative. I might speak to you, if I had time, on a few practical points in dairy farming.

COMING CHANGES THAT ARE NEEDED.

(1) In creamery districts, the farm separator. The farm separator is an evolution in creamery work, for the separation of the cream on the farm.

(2) The better construction of stables—light and ventilation.

(3) A better, more intelligent system of farming—the silo, clover and alfalfa.

(4) More intelligence in breeding and feeding our cows.

(5) The growing of more swine and young cattle. Old Jerseymen tell me that fifty years ago there was at least double the amount of swine and young cattle grown in New Jersey than there is to-day.

(6) The value of skim milk.

Now, you people are largely occupied with sending milk to the cities. How I have pitied you for your misfortune. No man has ever offered me for condensed milk or for city use as much money as I could make out of my milk. No man has ever received, except the man who gets twelve cents a quart—no man has offered me as much money as I get from my milk in the ordinary, common creamery. Now, how is it done? The fact of it is that I first saved myself a loss of about \$5 per cow in fertility. The man who sends his milk away loses about \$5 in fertility that he must pay for, must supply somehow. That is about the average per cow. In the second place, I am adding to the forces on the farm, and I want to give you just a little bit of experience I had last year. Last year the high prices of pork helped me very much; my skim milk, fed to the pigs raised on the farm and marketed at six months old, brought me 30 to 35 cents per 100 pounds, depending on the character and individuality of the pig; fed to a grade Guernsey heifer calf, it brought me 52½ cents per 100 pounds. The average return at that creamery was about \$1.20 a hundred. So that my milk brought about \$1.50 a hundred pounds fed to pigs, and from butter; about \$2.50 per 100 fed to grade Guernsey calves, and it brought me about \$2 per 100 when fed to registered Guernsey calves. Out of this the cream brought about \$1.20. I want to tell you, gentlemen, we have men right in our midst who are examples of fine management. Mr. Griswold, of West Salem, Wisconsin, with a herd of 20 Guernsey cows—and I went up to their fair last year and had that herd marched before me, and made an address to a large number of farmers—Mr. Griswold sold in cream at the rate of about \$100 a cow from that herd. Every cow there was a finished product of Mr. Griswold's brain and thought; a splendid tribute it was to a man's judgment.

Now, about these grade Guernsey calves. I have neighbors who say: "Why, Hoard, it is just because you do these things; nobody else could get what you do." But that is not true. But I try and put a little commercial wit into my business. I had seven grade Guernsey calves, which I had reared, and I take great pains in rearing my calves, and make more point of the first year of its life than I do in any other. I sold those seven grade Guernsey

calves for \$170, or an average of \$24.30, when seven months old. A man came into the neighborhood and paid me this money without any solicitation. But I had advertised them and said I had such stock for sale; and, consequently, there were men all over the State who knew I had some of these cattle. A man came there and paid me \$300 for seven yearlings and three calves, to make a bunch of ten, the three calves going in at \$30 apiece. Now, let us see what it cost me to keep them. I fed those calves from the time they were born until they were sold 3,500 pounds of warm skim milk, fresh from the separator; I fed them \$1 worth of oats, 50 cents worth of meal, and \$1.50 worth of alfalfa hay. The extra for feed over the skim milk was \$3, and I allowed \$3 for the carcass. This made the sum of \$6 to be subtracted from \$24.30, leaving \$18.30 for the skim milk—3,500 pounds of skim milk bringing \$18.30. No man could have bought my milk and given me anything like that profit—and I had the manure besides.

Now, under the influence of this kind of farming—and that is the kind of farming in my county—the land is continually rising. Walk into the cheese-making districts of New York, where the milk has been carted away for fifty years, and note the price of land. We must bring these two things together. The decline of value of land and the decline of fertility are almost inseparable in their connection with each other. There is such an opportunity—such an opportunity—in dairy farming for the exploitation of thought and brain and study. It is almost an illimitable field.

Gentlemen, I am very much gratified with your most kind and faithful attention. As the old hoosier said: "If I have said anything to be forgiven, why, go on and forgive me." (Applause.)

Vice-President Cox (in the chair)—The address is open for discussion.

A Member—How much a quart do you receive for your cream?

Mr. Hoard—I can't tell you how much a quart, but I will tell you this. In a herd of thirty cows the creamery paid me within a fraction of \$70 apiece for the cream, and the skim milk brought

me about \$25 per cow. I think it is the finest form of dairy farming that anybody can do to retain that skim milk on the farm. When milk goes down, do you know why? Because all over this country farmers are foolishly shipping their milk, because they can get the present penny. Now, that don't mean the best interests of the farm.

A Member—Do you separate your own milk or send it to the creamery?

Ex-Governor Hoard—We make the bull separate it; that is the price he pays for being a bull, and it takes a whole lot of devilment out of him, too. I have two Guernsey bulls, two years old about, one works on the power in the morning, the other at night, and they are as kind and gentle as kittens; but let them go about a week or two, and they commence making proclamations. (Laughter.)

Report of the State Commission on Bovine Tuberculosis.

For the Year Ending October 31st, 1903.

Report of the State Commission on Bovine Tuberculosis.

Acting under the law of 1894, Chapter 317, with the amendments thereto; Chapter 360, Laws of 1895; Chapter 145, Laws of 1898, and Chapter 80, Laws of 1901, the Commission has prosecuted the work committed to it by the Legislature, as applications for investigation were received.

The methods adopted by the Commission require the owner of any supposedly infected animals, at his own expense, to secure the services of a reliable veterinarian to make a preliminary examination, then, if in his judgment, tuberculosis exists in the herd, the Commission take up the case.

If it is found necessary to apply the tuberculin test, it is administered, and all animals showing the generally-accepted reaction are appraised and subsequently slaughtered in the presence of a member of the Commission or their duly authorized agent, as required by the law. In some cases the disease is so clearly evident, from a physical examination, the tuberculin test is not considered necessary, and such animals are disposed of after appraisement as stated.

During the past year applications have been made from all the counties except four. The counties from which no requests have been received are Cape May, Essex, Hudson and Passaic.

The number of applications received has been 195. The total number of animals examined is 2,450; total number condemned and found to be diseased is 473. Average sum paid for cows condemned is \$24.17.

The number of applications made from the different sections named show that this disease is not confined to any one locality. This fact, with the number of animals found to be diseased, should be a warning to every dairyman to be on his guard against this enemy to his prosperity and the healthfulness of his product.

The sooner suspicious cases are removed, the better it will be for the remaining members of the herd and for any healthy animals that may be brought in by purchase.

The territory covered by the Commission in its work during the past year, with the number of cases condemned, must convince fair-minded people that the State has not taken up this work of safeguarding the healthfulness of our dairy products any too soon.

The State is the proper and only agency that can effectually deal with a problem of this character. This work, as now carried on, is systematized and made uniform the State over. The door is open to all owners of cows, and all who wish to do so can apply for examination. No applicant is slighted, none are turned away, all are dealt with according to law. And it should be said to the credit of the law, and also to the fairness of the methods pursued by the Commission in its administration, that no applicant has found fault with either, even those who could receive but \$30, the maximum sum allowed, for animals that had cost \$300 per head a short time before they were examined by the Commission.

CAUSES OF INFECTION.

In our efforts to ascertain the causes of infection in the herds brought to our attention, we find a large majority of the applicants attribute it to the purchase of one or more animals of whose real condition they were not aware at the time they were bought. Many such animals are disseminated from herds having a bad history, and from public sales of similar herds.

Both for their own personal interests and as a means of checking the spread of bovine tuberculosis, farmers who are in the dairy business should be on their guard against introducing into their herds animals whose freedom from this disease is not reasonably guaranteed. And to this end we recommend that farmers buy only on the tuberculin test, particularly at public sales.

REPORT ON BOVINE TUBERCULOSIS. 315

STABLES AND SURROUNDINGS.

The Commission give special attention to the construction and condition of stables, conditions of barnyards, location of well, etc. This is deemed to be of great importance in connection with the reduction of this disease, and such recommendations are made as will, if put in practice, tend to remove conditions that are, to say the least, not conducive to health. Quite usually, where unsanitary and other undesirable conditions are found to exist, owners manifest a willingness to make the improvements suggested. There are others, a smaller number, who are not so willing to make the alterations recommended, even though the cost be but nominal. They assume that that which answered the purpose in the nineteenth century should be quite good enough for the twentieth century also.

But, as the demand for pure, wholesome dairy products increases, producers of milk will become convinced that the greatest success will accrue to him whose products are above suspicion from contamination by diseased animals or by unsanitary stables and surroundings.

APPROPRIATION FOR THIS WORK.

Chapter 80, Laws of 1901, allows an appropriation of fifteen thousand dollars (\$15,000) for this branch of the work of the Commission and for cattle condemned. For the year 1901 that sum was not all used, owing to the fact that enough applications were not received to require its expenditure, although there were numerous herds needing inspection.

For the fiscal year, closing with October 31st, 1903, however, \$15,000 will not be sufficient to meet the demands made. It would seem to be safe, therefore, to allow in the appropriation bill the sum expressed in the law, for, should a small balance remain unexpended, the State loses nothing by the operation.

In view of the unexpended balance of the previous year, the Appropriation Committee of the Legislature of 1903 reduced

the appropriation to twelve thousand five hundred dollars (\$12,500). Should the applications be as numerous and the demands upon the fund as heavy during the next fiscal year as they have been during the past year, it is quite evident the work will have to be suspended at a critical time, viz., when cattle are to be put in winter quarters, unless an additional sum be made available.

GENERAL VIEW OF THE WORK.

A good proportion of the heaviest work of the Commission during the past year has been in neighborhoods not hitherto inspected. A single application has led to several others from the same locality; and this, for the reason that the first and subsequent examinations revealed a diseased condition among the members of the herds not anticipated when the applications were made.

In some of these cases the owners were heavy losers, as their animals were very valuable. One of these, a gentleman of prominence in this State, wrote us: "I am entirely satisfied with your action with regard to the killing of my cows, and am, indeed, glad that you took the heroic measures you did. The autopsy proved, as you say, that you were right and the necessity of your action. Believe me, I fully appreciate it, and am your debtor for the course you took. I should like your advice as to my remaining cattle."

Another gentleman wrote the Secretary thus: "Allow me to thank you and your Commission for the kind and courteous manner you have treated me, after placing my cattle in your hands."

One of our northern county papers, speaking of the efforts of one gentleman in the locality to rid his herd of diseased animals, said: "Mr. — is to be commended for the precaution he is taking to maintain a healthy herd of dairy cows. It would be well if all the dairies in the township were similarly tested and all infected cows sacrificed. The disease can thus be stamped out."

Another paper, in an adjoining county, speaking of another case, said: "The largest slaughter of cows ever made in — county occurred on Tuesday of last week. A careful post-mortem

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showed extensive existence of the disease. Much interest was created in the community by the affair, and enough farmers were present to constitute a good-sized country vendue. The object lesson was a good one, and the opinion of those present was that these laws controlling contagious diseases are good and a benefit to everybody, especially to the farmer. Mr. —, like other farmers, had no idea that he had any diseased animals until recently one died. That the disease was present to any further extent was farthest from his mind."

Another paper, speaking of another case, says: "After the examination and the condition of the cows was made manifest, the most doubtful were converted to the idea that the enforcement of the laws to prevent the spread of the disease is now a necessity."

The above extracts will suffice to show the feelings of the owners of cattle condemned, the sentiments of the press, and the opinions of those disinterested persons who have witnessed the work in the localities indicated.

There are districts in different parts of the State where the demands made upon the Commission were the most numerous in the first years of its work, that now send in but few requests for examination. From our knowledge of the general condition of such localities, the falling off in applications is evidence that conditions are improving, healthy animals are purchased and the disease is being reduced in extent. This is a hopeful sign.

By carefulness in breeding, by the removal of diseased animals from existing herds, by excluding suspicious ones from other States and by improving local conditions so that they shall contribute to, rather than endanger, the health of our animals, general improvement in dairy conditions and products will follow.

The following table will show the counties visited, number of examinations made, cattle condemned and amounts paid during the fiscal year, closing with October 31st, 1903:

<i>County.</i>	<i>Total No. Examined.</i>	<i>Total No. Condemned.</i>	<i>Total Sum Paid.</i>
Bergen,	4	2	\$39 00
Burlington,	257	82	2,010 00
Camden,	17	3	55 50
Cumberland,	69	30	699 00
Gloucester,	76	8	150 00
Hunterdon,	212	29	609 75
Mercer,	290	41	995 25
Middlesex,	56	7	141 00
Monmouth,	10	2	45 00
Morris,	90	21	516 00
Ocean,	43	26	674 25
Salem,	520	54	1,170 75
Somerset,	222	89	2,532 00
Sussex,	420	55	1,311 00
Union,	120	19	351 00
Warren,	44	5	135 75
	<hr/> 2450	<hr/> 473	<hr/> \$11,435 25

Total appropriation,	\$15,500 00
Total sum paid for cows,	\$11,435 25
Expenses of inspection,	1,504 67
Expenses of commission,	436 08
Secretary, assistant and stenographer,	2,116 00
Blanks,	8 00
	<hr/> \$15,500 00

Mr. Collins—Mr. Chairman, I feel like congratulating this Board and the cattle-owners in general on the way that this whole question has been acted upon—that is, the control being in these conservative hands—it is very gratifying, more especially as I know what an effort was made to get it into other and less conservative hands. My supposition was that after being examined and condemned these cattle were destroyed; but I have heard it has been the practice to drive them through the country rather than kill them on the place. Is that correct?

Mr. Ketcham—I can answer that, Mr. Chairman. In a few instances, and especially where a large number have been condemned in Salem county more especially, the owners did not want them slaughtered on the place, and they were sold to a fertilizer man in Philadelphia, who gave the owners about the price of the hides; they were driven there, and the veterinarian of the Commission went there, saw them slaughtered, and made post

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mortem returns, and we have the returns in the office. That was done to accommodate the owners, and they were all slaughtered under the direct supervision of the officers of the Commission.

Secretary Dye—I would say, too, further, in reply to Brother Collins, that up in Morris or Somerset, up in that section of the country, there were a number of cows killed and literally torn to pieces by Mr. Ketcham and the veterinarian, and later I got a notice from the Newark Board of Health stating that the cattle which had been condemned had been sold in Newark for beef. So these suspicions arise. But the law says they must be condemned and slaughtered, and this the Commission has been strict in enforcing.

Mr. Collins—I think this very lot of cattle Mr. Ketcham speaks of came from Woodstown, and they were intended to go by boat, but the boat had gone. That is probably the instance.

Mr. Hoard—Mr. Chairman, I would like to say a word, sir, upon this subject. I deem it to be one of the most important considerations that affects the well-being of every individual dairyman in the land. I have had a good deal of experience with it. I have a thoroughbred Guernsey herd. I have slaughtered some exceedingly valuable animals that I purchased, and eventually found myself deceived. I purchased six heifers from one man and killed four out of the six. I could not call upon him, because I purchased them at my own risk. This was in the early part of my experience. Now I have come to this settled rule in my conduct of my farm, that not an animal goes on to the farm that is not thoroughly healthy, nor an animal shall go off that has not as thorough a health record as possible. Under those circumstances there have been evolved in my experience some things which have been exceedingly interesting to me, and I think if more discussion could be had among the cattle people, and particularly in the Eastern States as well as in the West, the two propositions, ventilation of stables and tuberculosis, would go hand in hand. It has seemed as though it were a strange thing that in this intelligent age, and in all the full blaze of information on this question, you can travel through almost every dairy district in the United States and find not one stable in a hundred is properly ventilated.

Secretary Dye—We are getting some of them in our State now, Governor.

Mr. Hoard—I am glad of it. In my own State we have a certain department of creameries, known as the Hoard Creamery, and I will say not one of those 800 men to-day have their stables properly ventilated, and in one I have known as high as twenty-five out of thirty-two cows to be killed. These stablemen know a certain amount of heat must be maintained in order that the process of lactation should go on. The cow can't produce milk unless she has sufficient heat. What do they do? They shut up those stables intact, and then introduce steam until it is like a hothouse and the whole herd is suffering. In one instance, twenty-five out of thirty-two, and in another instance twenty-seven out of forty, were killed, and in a number of instances these herds have been fearfully decimated. And yet I believe a little work on the part of the owner could have stopped it all. There is a prejudice among farmers on this question, and in order to fortify themselves you will hear them rail out against tuberculin tests, when the tuberculin test is the most accurate among any known systems of investigation or tests. Under those circumstances, it seems to me there ought to be an especial emphasis made on this question. I believe New Jersey has got cattle enough and has got dairy interests enough for her to hold one or two strong, large dairy meetings during the winter and discuss this question and other dairy questions. (Applause.) It is an astonishing thing to me, gentlemen, to find that in any of the New England States the people are alive on the dairy question, and yet in New Jersey I find there is no organized effort to bring this question up for discussion, as I think it ought to be. Pardon me for this criticism.

A Member—Give it to them, they deserve it all.

Ex-Governor Hoard—I know, but if you find a crowd of men so mighty patient, what are you going to do? I hope the Chair will excuse me for this little bit of time. A simple and cheap system of ventilation can be put up into any stable, and it can be done at very small expense. When I built my barn it cost me \$350 to put in the King system of ventilation. Now, I had a number of men come to me and say: "Why, Hoard, you can't

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afford so much money as that for air." Air! "Well," I said, "why, a cow lives on three things: food and drink and air. Do you know any reason on earth why any one of them should be denied, why any one of them should not be pure and good?" Men who would be horrified to live themselves in the presence of such foul conditions, force a cow to do it, and they will do that and then go back and thank Providence they are not as other men are. (Laughter.) "Three hundred and fifty dollars," I once said to a neighbor, "what does that cost me?" He said: "It cost you \$350." "No, it did not," I said. "How do you get out of that? You paid the money, didn't you?" he asked me. "Yes," I replied, "but I lent the money to this purpose, and it cost me the interest on \$350 annually—that is, an annual cost of \$21. There are fifty animals there; it is less, you see, don't you, than fifty cents an animal? Now, look them over, John. See how bright they look. This air, changed every hour in this stable, 142 feet long. Step in with me in the morning. How much of the usual smell of the stable can you detect?" "Why," he says, "it is clear; I never saw anything like it." "And yet," I said, "you stand and haggle on fifty cents a cow, two hundred days or more." Gentlemen, that is all. (Applause.)

Mr. Ketcham—Mr. President, I feel grateful to Governor Hoard for those words concerning the care of our dairy animals. As you know, I have been in the tuberculosis work now for four years. I have seen stables under all conditions and circumstances, and can endorse every word Governor Hoard has said. Now, just a word about the importation law. There was considerable friction, in the early stage of the law, as Mr. Dye stated in his report, but to show the necessity of it, a carload of cattle came into the State of New Jersey about two weeks ago that had not been tested, although they claimed they had been, but no record of the test came to the office, and the case had to be decided. The result was that in that carload nine were condemned; they came from the State of New York. Other cases could also be given which show the importance of our importation law.

There is another thing, if I may speak of it here, and that is it would be of the utmost advantage if every farmer holding a public sale of his cattle in the State of New Jersey would have

them tested before they were sold. (Applause). Very recently a farmer made a sale, but before it was over, a suspicion spread that tuberculosis existed in the herd, and buyers refused to take the animals. Whereupon he applied to the Commission for a test. The test was made and seven out of nine were condemned. The inference is plain. Every farmer who has a public sale ought to have his cattle tested.

A Member—I think the idea of testing cattle before a public sale would be very good, but would not the State very soon spend all the appropriation in paying for the animals that were condemned? The idea is an elegant one, but are we ready to spend the money for it?

Mr. Ketcham—The cost would be less if they were tested before the sale, as later the Commission would be called on to test them in several different herds, perhaps.

Mr. Pancoast—I wish to say that ventilation is not a panacea for the disease. If you have it, no matter how good your stables are, it will spread. That has been proved in the State of Pennsylvania. Under the most favorable conditions it will spread, notwithstanding all the light and ventilation you can give. I endorse everything Governor Hoard has said about the necessity of ventilation, without considering tuberculosis.

IMPORTATION LAW.

The work of the Commission under Chapter 181, Laws of 1899, has been administered faithfully and with due regard to the interests of cattle dealers and importers, of buyers and of the public at large.

As we understand it, the law was enacted for the good of all concerned. That there was occasion for it was evident from the gross outrages committed against our milk and meat consumers by unscrupulous persons. As with all laws intended to suppress crime, honest persons in the business affected by the law are put to some inconveniences. These, however, in the case of this law, are few, and they are not of sufficient importance to outweigh the beneficial effects to the dairy interests of the State by its enforcement.

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The mere sending to the office of the Commission for a permit to bring cattle into the State and a short delay before public sale of the cattle for the purpose of testing, are small matters compared with the prevention of diseased animals from other States entering New Jersey, to the permanent injury of our dairies, and, possibly, the health of our people.

Attempted evasions of the law by some cattle dealers are less numerous now than they were a year ago. A visit to and a personal interview with these, explaining the law to them and immediately enforcing its requirements, has had a salutary effect. Such men have found a course of evasion more expensive and troublesome to them than conforming to the law would have made necessary. As the purpose of the enactment becomes better understood, both importers and purchasers of cattle are becoming better satisfied with it.

There are a few unscrupulous practitioners in other States claiming to be qualified and reliable veterinarians, who, in collusion with unprincipled dealers, have attempted to pass cattle with a bogus inspection. The Commission is diligently ferreting out these, and, as soon as the case is proved against them, they are not allowed to do any further work in relation to cattle intended for the New Jersey market. This is all the Commission can do in the case of non-resident practitioners.

The total number of cattle imported during the year, as recorded on the books of the Commission is 8,216. This is 8,911 less than the number imported in 1902, and 3,418 less than in 1901.

There are three plausible reasons for this reduced importation. First, the protracted drought that prevailed during the early summer. This made the maintenance of our dairy herds a costly business. The barns being empty and the grass a failure, made it necessary to feed the more costly concentrated foods, so that farmers could not profitably increase their dairy herds.

Another reason may be the very large importation of the two pervious years so increased and satisfied the demands of our dairy business that fewer additions from without were needed; and third, more stock is being bred and raised by our farmers than formerly.

NEW JERSEY STATE LIBRARY

Report of the State Board of Health

For the Year Ending October 31st, 1903.

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Report of the State Board of Health.

To the Board of Agriculture of the State of New Jersey:

GENTLEMEN—In accordance with the provisions of the act approved May 4th, 1886, the following record is submitted, showing the number of cases of infectious diseases among animals reported to the State Board of Health during the year ending October 31st, 1903, together with the names of the sanitary districts in which the cases occurred, the dates of the reports, the names of the persons making reports and the disposal of the infected animals in each case.

LIST OF CASES OF GLANDERS OCCURRING DURING THE YEAR ENDING OCTOBER 31, 1903.

<i>Name of Sanitary District.</i>	<i>Date and Number of Cases Reported.</i>	<i>Name of Person Making Report.</i>	<i>Disposal of Each Case.</i>
Orange,	Nov. 17, 1902 1	William Schluer,	Animal destroyed.
Caldwell,	Dec. 21, " 1	W. F. Harrison, D.V.S.,	" "
Paterson,	Dec. 22, " 1	W. H. Lowe, D.V.S.,	" "
Newark,	Jan. 2, 1903 1	David Chandler, H.O.,	" "
"	" 3, " 1	" " "	" "
"	" 4, " 1	" " "	" "
"	" 5, " 3	" " "	" "
"	" 6, " 5	" " "	" "
"	" 12, " 7	" " "	" "
East Orange,	" 12, " 1	W. F. Harrison, D.V.S.,	" "
Newark,	" 24, " 1	David Chandler, H.O.,	" "
"	" 26, " 7	" " "	" "
"	" 29, " 11	" " "	" "
Paterson,	Feb. 13, " 4	W. H. Lowe, D.V.S.,	" "
Fairlawn,	" 14, " 1	" " "	" "
Newark,	" .. " 27	David Chandler, H.O.,	" "
Jersey City,	Mar. 6, " 1	T. E. Smith, D.V.S.,	" "
Jersey City,	" 21, " 3	" " "	" "
Paterson,	" 28, " 1	W. H. Lowe, D.V.S.,	" "
Parsippany,	" 24, " 1	Dr. McDonough,	" "
Newark,	" .. " 31	David Chandler, H.O.,	" "
Oakland,	April 3, " 1	Dr. Finch,	" "
Delawanna,	" 8, " 1	J. P. Lowe, D.V.S.,	" "
Passaic,	" 11, " 2	" " "	" "
Orange,	" 13, " 1	W. F. Harrison, D.V.S.,	" "
Nutley,	" 18, " 1	" " "	" "
Allwood,	" 20, " 1	J. P. Lowe, D.V.S.,	" "
Hoboken,	" 29, " 2	D. J. Dixon, D.V.S.,	" "
Newark,	" .. " 21	W. Runge, D.V.S.,	" "

STATE BOARD OF AGRICULTURE.

<i>Name of Sanitary District.</i>	<i>Date and Number of Cases Reported.</i>	<i>Name of Person Making Report.</i>	<i>Disposal of Each Case.</i>
Passaic,	May 5, 1903 2	J. P. Lowe, D.V.S.,	Animal destroyed.
Jersey City,	" 6, " 2	T. E. Smith, D.V.S.,	" "
West New York, ..	" 24, " 2	C. J. Rooney,	" "
West Hoboken,...	" 24, " 2	" " " " " " " " " "	" "
Union, Hudson, ...	" 24, " 1	" " " " " " " " " "	" "
Verona,	" 25, " 1	W. F. Harrison, D.V.S.,	" "
Newark,	" 28, " 5	W. Runge, D.V.S.,	" "
Jersey City,	" 29, " 1	D. J. Dixon, D.V.S.,	" "
Newark,	June 8, " 4	W. Runge, D.V.S.,	" "
"	" 15, " 2	" " " " " " " " " "	" "
"	" 20, " 3	" " " " " " " " " "	" "
Bloomfield,	" 16, " 1	W. F. Harrison, D.V.S.,	" "
Bayonne,	" 18, " 1	Dr. Halliday,	" "
Jersey City,	July 2, " 1	D. J. Dixon, D.V.S.,	" "
Bloomfield,	" 2, " 1	W. F. Harrison, D.V.S.,	" "
"	" 3, " 2	Mr. Smellie,	" "
Passaic,	" 11, " 2	J. P. Lowe, D.V.S.,	" "
Newark,	" 13, " 6	W. Runge, D.V.S.,	" "
Passaic,	" 18, " 1	J. P. Lowe, D.V.S.,	" "
Paterson,	" 20, " 1	W. H. Lowe, D.V.S.,	" "
Jersey City,	" 24, " 1	" " " " " " " " " "	" "
Paterson,	" 27, " 1	" " " " " " " " " "	" "
Bayonne,	" 29, " 1	Dr. Halliday,	" "
Newark,	" 31, " 2	W. Runge, D.V.S.,	" "
Passaic,	Aug. 1, " 1	Dr. Hasbrouck,	" "
Haledon,	" 5, " 1	W. H. Lowe, D.V.S.,	" "
Jersey City,	" 5, " 1	T. E. Smith, D.V.S.,	" "
Jersey City,	" 10, " 1	E. Matthews, D.V.S.,	" "
Delawanna,	" 11, " 1	— — — Fredericks,	" "
Rutherford,	" 15, " 1	W. H. Lowe, D.V.S.,	" "
Jersey City,	" 15, " 2	" " " " " " " " " "	" "
Newark,	" 15, " 1	" " " " " " " " " "	" "
Coytesville,	" 17, " 1	S. S. Treadwell, D.V.S.,	" "
Paterson,	" 24, " 1	W. H. Lowe, D.V.S.,	" "
Newark,	" 27, " 4	" " " " " " " " " "	" "
Hoboken,	Sept. 1, " 1	D. J. Dixon, D.V.S.,	" "
Newark,	" 4, " 1	W. F. Harrison, D.V.S.,	" "
Jersey City,	" 10, " 4	W. H. Lowe, D.V.S.,	" "
Newark,	" 11, " 1	J. C. Corlies, D.V.S.,	" "
Hoboken,	" 13, " 1	E. Matthews, D.V.S.,	" "
Newark,	" 14, " 1	W. H. Lowe, D.V.S.,	" "
Jersey City,	" 21, " 1	" " " " " " " " " "	" "
Hoboken,	" 22, " 4	D. J. Dixon, D.V.S.,	" "
Jersey City,	" 23, " 3	W. H. Lowe, D.V.S.,	" "
Passaic,	" 25, " 1	J. P. Lowe, D.V.S.,	" "
Newark,	Oct. 1, " 2	W. H. Lowe, D.V.S.,	" "
Passaic,	" 2, " 1	" " " " " " " " " "	" "
Hoboken,	" 5, " 1	D. J. Dixon, D.V.S.,	" "
Union Hill,	" 21, " 1	R. F. Meines, D.V.S.,	" "
Jersey City,	" 22, " 1	T. E. Smith, D.V.S.,	" "
Jersey City,	" 24, " 1	" " " " " " " " " "	" "

NOTE.—In addition to these tabulated cases eleven horses had died of glanders in Newark, but no report had been made to the local authorities.

In addition to the foregoing, an outbreak of anthrax occurred in Salem and Cumberland counties during July and August. The first cases appeared among animals which were pastured on Round and Ragged Islands, in the Delaware river, within the

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limits of Lower Alloways Creek township. The disease was found to be spreading rapidly when it was first reported, and immediate steps were taken to isolate the affected cattle and immunize those which had been exposed to the infection. The number of animals inoculated was 3,016, and the number of deaths from anthrax was 172.

SUMMARY.

Losses of animals from anthrax,	172
Inoculations to prevent anthrax,	3,016
Animals destroyed on account of glanders,	237
Cases of rabies reported,	11

Very respectfully,

HENRY MITCHELL,
Secretary.

Report of the State Entomologist.

JOHN B. SMITH, Sc.D.

(33I)

Report of the State Entomologist.

JOHN B. SMITH, SC.D.

At the last meeting of this body the Committee on Legislation was instructed to co-operate with a committee from the State Horticultural Society in securing an insect law that would give greater protection to the New Jersey horticulturist and would prevent our orchards from becoming dumping-grounds for stock that cannot be sold elsewhere.

This joint committee, after several meetings and after consultation with the Entomologist, agreed upon the following bill, which was presented to the Legislature and became

CHAPTER 249, LAWS OF 1903.

An Act to prevent the introduction into and the spread of injurious insects in New Jersey, to provide a method for compelling their destruction, to create the office of state entomologist, to authorize inspection of nurseries and to provide for certificates of inspection.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

1. All gardeners, horticulturalists, farmers, nurserymen and other growers of or dealers in plants of any kind, upon their own or upon leased lands or premises, shall free and keep freed all plants, shrubs, trees, vines, cuttings, cions, buds, stocks or other plant parts grown, cultivated or dealt in by them, from all injurious insects that might spread from the plants infested to others on the public highways, or upon lands adjoining or belonging to others; all plants, shrubs, trees or parts of such so infested, are hereby declared to be a nuisance, to be abated as herein prescribed, and their maintenance after notice given as hereinafter set out is hereby declared a misdemeanor, punishable as hereinafter provided.

2. For the purposes of this act the entomologist of the state experiment station is hereby declared to be the state entomologist, to serve as such at such compensation as may be prescribed by the executive committee of the

state board of agriculture, and said committee, which is hereby charged with the execution of this act, may appoint an assistant or deputy to the state entomologist, at such compensation as it may fix; said executive committee may also appoint such temporary assistants and inspectors as may be needed to carry out the provisions of this act, at such compensation as it may deem reasonable.

3. The term nursery as used in this act shall include any and all lands, premises and buildings upon, on or in which plants, trees, shrubs or vines of any kind, whether for fruit, shade or ornament, are grown for sale within the state or for shipment to other states or countries; the term nursery stock as used in this act shall be held to include any and all plants, shrubs, trees and vines grown for sale, as well as buds, grafts, stocks, cions and other parts of plants, shrubs, trees and vines that may be sold for propagation; but it shall not apply to herbaceous annuals nor to plants, flowers, vines or cuttings grown under glass and commonly known as florists' stock; the term nurseryman as used in this act shall be held to include any person, firm, copartnership or corporation growing plants, trees, shrubs or vines for sale, or dealing in such stock, whether he or they be owners, lessees or tenants of or on the premises upon which such stock is grown or offered for sale.

4. It shall be unlawful for any nurseryman within the state to sell or offer for sale any nursery stock or to deliver the same within the state until it has been inspected by the state entomologist or his deputy, and until a certificate has been issued to him in accordance with the provisions of this act; it shall be the duty of every nurseryman growing stock within this state, and of every dealer in nursery stock, to attach to every car, box, bale or parcel of stock sent out or delivered by him, a written or printed copy of the certificate issued to him by the state entomologist, together with a written or printed copy of a declaration signed by such nurseryman, stating that the stock contained in such car, box, bale or parcel was part of that covered by such certificate, and that the conditions upon which such certificate was issued have been fulfilled; such statement shall be considered a warranty as to the source of said stock, for a breach of which a certificate may be withdrawn by the state entomologist.

5. All nurserymen growing or dealing in nursery stock within this state must erect and maintain upon the nursery upon which their stock is grown, or in connection therewith, a structure suitable for fumigating nursery stock with hydrocyanic acid gas, which shall be inspected by the state entomologist, whose duty it shall be, if he finds the building properly constructed for the purposes, to mark upon the same the amounts of the materials to be used for the fumigation of the stock grown upon such nursery; said entomologist shall also direct the manner in which fumigation is to be done and the length of time during which the stock is to be exposed to the action of the gas.

6. It shall be unlawful for any nurseryman to send out or ship from his nursery any stock not thoroughly fumigated with hydrocyanic acid gas, to any point within or without the state, unless such nurseryman holds a certificate from the state entomologist that the stock grown upon such nursery is free from dangerously injurious insect pests or those liable to become so; *provided*, that this requirement shall not apply to evergreens, conifers, herbaceous plants or to plants grown under glass only and known as florists' stock.

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7. It shall be the duty of the state entomologist to examine and inspect, or cause to be examined and inspected, at least once in each year, at such time or times as he may determine, with or without notice to the nurseryman, all nurseries within the state, to ascertain whether the stock grown thereon is free from dangerously injurious insects and from such as in his opinion are likely to become so when transplanted or set out into orchard, vineyard, field or garden; and every nurseryman within the state shall have the right to demand that such inspection be made, in case his nursery has not been inspected prior to the first day of October in any year; no fee or other charge for inspections shall be made against any nurseryman.

8. After any nursery has been inspected it shall be the right of a nurseryman to demand of the state entomologist a certificate stating the condition of the stock on the inspected premises, and it shall be the duty of the state entomologist to give a certificate in accordance with the facts found; if the inspection shows the presence of dangerously injurious insects or of such as are likely to become so, the entomologist shall require of the nurseryman that he destroy the infested stock and that he treat that exposed to infection in such manner as may be necessary to render such insects harmless and the stock safe; if the inspection shows that a nursery is apparently free from dangerously injurious insects, or from such as are liable to become so, the state entomologist shall issue his certificate to that effect, specifying in such certificate the date up to which it shall remain valid; *provided*, that he may impose as a condition that the nurseryman comply with the requirements of section six of this act, and this condition must be accepted in writing by such nurseryman; any nurseryman whose premises have been found infested may, after he has complied with the requirements made by the state entomologist, apply for a re-inspection of his stock, and the state entomologist shall, if he finds the conditions fulfilled and the stock apparently clean, issue his certificate to that effect upon such conditions as may be deemed necessary for the protection of purchasers; such conditions must be in writing and must be accepted by the nurseryman in writing.

9. It shall be the privilege of any nurseryman or dealer to ship under the certificate issued to him, nursery stock grown for him elsewhere, or purchased by him from other states or countries; *provided*, that all such stock be received under a certificate satisfactory to the state entomologist, that it had been inspected where grown and found to be apparently free from dangerously injurious insects or such as were liable to become so; and no such stock shall be sold within the state or shipped until the certificate accompanying it shall have been submitted to the state entomologist and approved by him.

10. Any nurseryman who sells or ships to points within the state, without a certificate of inspection made or without fumigation as prescribed in section six, shall be deemed guilty of a misdemeanor and subject to a fine of fifty dollars for every sale or shipment made in violation of sections four and six of this act; any nurseryman to whom a certificate has been issued, who shall use the same on stock not actually inspected, or who shall in any way fail to comply with the conditions upon which such certificate was issued or the requirements of this act, shall be deemed guilty of a misdemeanor and subject to a fine of one hundred dollars for each offense, and his certificate may be withdrawn and cancelled in the discretion of the state entomologist.

11. All nursery stock shipped into this state from any foreign state or country must be accompanied by a certificate, dated not more than six months prior to the date of such shipment, or by a written or printed copy of such certificate, attached to each car, box, bale or parcel thereof, stating that the stock to which such certificate is attached has been inspected by an officer duly authorized by the laws of the state where such stock was grown, and that the same was found to be free from dangerously injurious insects or from such as might be liable to become so when introduced into nursery, vineyard, farm or garden; any such certificate shall be accompanied by a written or printed statement from the nurseryman shipping the same, declaring that such stock is part of that which was inspected by or under the direction of the officer signing the certificate, and he shall further state whether or not such stock has been fumigated with hydrocyanic acid gas; any car, box, bale or parcel of nursery stock shipped into this state, unaccompanied by a certificate as above required, may be seized and detained by the state entomologist or under his direction wherever found, whether in the hands of a common carrier or in the hands of the consignee or his agents, and such stock may be held and detained until the same has been inspected and found free from dangerously injurious insect pests and from such as in the judgment of said entomologist are liable to become so; in case any stock so examined is found to be infested as above described, it shall be the duty of the state entomologist, and he is hereby empowered, to destroy such infested stock, and he shall require such as may not be actually infested to be submitted to such treatment as he may deem necessary to make it safe and the insects that may be harbored in or on it, harmless; it shall be also the duty of said entomologist when, in his opinion, there is reason to doubt the truth of any certificate or a nurseryman's statement thereunder found attached to any car, box, bale or parcel of stock shipped into this state, to detain such car, box, bale or parcel of stock until the same has been inspected under his direction, and in case such stock is found to be infested it may be treated as uncertified, and all future shipments received from the same nurseryman may be thereafter regarded and treated as uncertified.

12. It shall be the duty of the state entomologist, whenever complaint is made to him that any person, firm or corporation is maintaining a nuisance as prescribed in section one of this act, to investigate or cause to be investigated, as soon as conveniently possible, the truth of such charge; if after such investigation he decides that such a nuisance exists, he shall notify, in writing the owner or occupant of the premises containing the nuisance complained of, of the fact that such nuisance exists; he shall include in such notice a statement of the conditions constituting such nuisance, an order that the same be abated within a specified time, which shall not be less than ten days from the date of such notice nor less than eight days from the date of its service as herein prescribed, and a direction, written or printed, pointing out such methods as should be taken to abate the same; such notice and order may be served personally, or by depositing the same in the post-office, properly stamped, addressed to the owner or occupant of the land or premises upon which such nuisance exists, and the directions for treatment may consist of a printed circular, bulletin or report of the state or college experi-

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ment station or an extract from the same; in case the notice and order served as aforesaid shall direct that any growing plant, shrub or tree shall be taken out and destroyed, and the owner or grower of such plant, shrub or tree shall consider himself aggrieved thereby, he shall have the privilege of appealing, within three days after the receipt of the notice, to a committee of appeal, consisting of three members of the state board of agriculture to be appointed by the executive committee of said board for that purpose; the appeal must be in writing, directed to the secretary of the state board of agriculture at Trenton, and must contain a statement of the reasons why the order of the state entomologist is deemed unjust; written notice of such appeal served by mail upon the state entomologist shall operate to stay all proceedings until the decision of the committee of appeal, who may, after investigating the matter, reverse, modify or confirm the order of the state entomologist; such decision shall then become the order of the state entomologist, who shall serve the same as hereinbefore set out and shall fix the time within which such decision must be carried out; the compensation and expenses of such committee of appeal shall be fixed by the executive committee of the state board of agriculture.

13. It shall be the privilege of any farmer, horticulturist or other grower of fruits within this state to request an examination of his trees or other fruit-bearing plants, to determine whether or not they are infested by any dangerously injurious insect pest, and it shall be the duty of the state entomologist to examine or cause to be examined such trees or other fruit-bearing plants with all convenient despatch; in case such trees or plants are found to be so infested, it shall be the duty of the state entomologist to inform the owner as to the best methods of treating such trees and plants that they may be preserved if possible and the spread of such insects checked; this section shall be held to apply only to such insects as may endanger the life of the infested trees or plants and may spread from such as are already infested to others in their vicinity.

14. Any person, firm or corporation failing to obey an order of the state entomologist made and served as prescribed in section twelve, within the period of time therein specified, shall be deemed guilty of a misdemeanor, and liable to punishment by a fine of fifty dollars besides the cost of the suit, and if the order of the state entomologist commanded the destruction of any trees, shrubs, plants or nursery stock, the judgment of the court imposing the fine shall include also an order to the officer enforcing its judgments to seize and destroy the specified trees, shrubs, plants or nursery stock, in accordance with the order, which the said officer shall thereupon be fully authorized to do; fines recovered under this act shall be collected and chargeable as are other judgments of the court imposing the same.

Note.—Section XV was amended as follows and is published as Chapter 47, Laws of 1904.

An Act to amend an act entitled "An act to prevent the introduction into and the spread of injurious insects in New Jersey, to provide a method for compelling their destruction, to create the office of state entomologist, to authorize inspection of nurseries and to provide for certificates of inspection," approved April fourteenth, one thousand nine hundred and three.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*:

1. Section fifteen of the act to which this is an amendment is hereby repealed and the following substituted:

15. Proceedings to enforce the provisions of this act shall be brought in the name of and prosecuted by the state board of agriculture, through the committee of appeal appointed by the executive committee of the board, as prescribed in section twelve of this act; every district court and every justice of the peace in any city or county and every police justice or recorder in any city, is hereby empowered on complaint under oath or affirmation made according to law that any person or persons has or have violated any of the provisions of this act, to issue process in the name of the state board of agriculture of the state of New Jersey as prosecutor, for the use of the state of New Jersey; said oath or affirmation may be made upon information and belief by any member of said committee of appeal and the complaint shall be based upon a report from the state entomologist, certifying the character of the offense committed and the proof supporting the charge; said process shall be in the nature of a summons, returnable in not less than one nor more than ten entire days and shall state what section of the law is alleged to have been violated by the defendant or defendants; at the return of said summons or at any time to which the trial shall have been adjourned, the said district court, justice of the peace, police justice or recorder, shall proceed summarily to hear the testimony, and to determine and give judgment in the matter without the filing of any pleadings, either for the prosecutor for the recovery of the fine or penalty incurred, with costs, or for the defendant or defendants; if such judgment be for the prosecutor as aforesaid it shall state the character of the complaint, the section of this act under which the proceedings were taken, the date of the trial, the names of the witnesses who testified for the prosecutor, the names of the witnesses who testified for the defendant, the amount of the fine or penalty for which judgment is given, which shall be the sum specified in the section of this act under which the proceedings were taken and the judgment obtained, the amount of costs assessed against the defendant, which shall be the costs allowed by the provisions of the act entitled "An act concerning district courts," approved June fourteenth, in the year one thousand eight hundred and ninety-eight; such other or further orders to the officer authorized by law to enforce such judgment as are provided for in section fourteen of this act, and that execution do issue against the goods and chattels of said defendant for the amount of said fine or penalty and costs; said judgment shall be signed by the judge of the district court, justice of the peace, police justice or recorder giving the same; the officers to serve any process or execution issued as aforesaid shall be the county constables, and within the jurisdiction of any district court shall include the sergeant-at-arms thereof, which service and execution shall in all cases be made in the same manner and under the same liabilities that other processes and executions issued out of the district courts of this state are served and executed under and by virtue of the act concerning district courts cited above; all fines or penalties and costs shall be paid by the officer collecting the same to the treasurer of the state board of agriculture who shall, after de-

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ducting therefrom the necessary costs of prosecution, pay the balance into the treasury of the state, accompanied by a statement showing the amount collected and the cost of collecting the same; said officer executing the judgment shall also, if it contains an order to seize and destroy trees, shrubs or other plants, make return to the court from which the execution issued, stating that the order has been carried out, or if it has not been carried out, the reasons why the judgment of the court could not be enforced.

2. This act shall take effect immediately.

Approved March 22, 1904.

16. For the purpose of making the inspections, examinations and investigations specified in this act, and to enforce the provisions of the same, the state entomologist and his duly appointed deputy may enter upon any lands, open or inclosed, upon which such inspections, examinations and investigations are necessary or where any nuisance as defined in section one of this act is maintained or charged, and into any storehouse or building containing nursery stock which he is herein directed or entitled to inspect, and any interference with or obstruction made to the entomologist or his deputy while engaged in the performance of the duties herein imposed shall subject the offender to punishment as a disorderly person under the general laws of this state upon a charge made against him by the officer interfered with.

17. The sum of three thousand dollars annually is hereby appropriated to the state board of agriculture for the purposes of this act; *provided*, that no payment shall be made pursuant to this act until the amount thereof shall have been included in the annual appropriation bill.

18. Chapter one hundred and four, laws of one thousand eight hundred and ninety-eight, bearing the same title as the present act, is hereby repealed.

19. This act shall take effect immediately.

Approved April 14, 1903.

Especial acknowledgment for securing the passage of this act in the Assembly belongs to Mr. D. D. Denise, whose aid at critical moments helped it over obstructions.

Under this law nurserymen are held to a much greater responsibility, and they are compelled to deal as justly with our own people as with those in other States. It is fair to the reputable nurserymen to say that almost without exception they were ready to do anything within reason to put their stock into clean, healthy condition.

It is to be regretted that there are some men who saw only the fact that they could not dispose of their scaly stock, and who talked loudly of an intention to secure the repeal of the law or to contest its constitutionality. Up to the present time, however, there is only one man who has made himself liable to a penalty,

and his case is in the hands of the Committee of Appeal for prosecution.

The new law, besides giving greater power to the Entomologist, carries a substantial appropriation, and I was able to secure for the current year the services of Mr. E. L. Dickerson, who has had a thorough training in nursery inspection work.

A systematic hunt was made for nurseries, large and small, and nearly or quite seventy-five of them were located. Under the old law a nurseryman could ask for an inspection and, if entitled, could demand a certificate; but he was under no obligation to have his stock inspected, and he could sell anywhere or to anyone who was willing to buy, no matter what condition his trees were in. He was also expected to pay the expenses of inspection.

Under the new law no nurseryman can legally sell even a single tree until his stock has been inspected and certified. But all inspections are made without cost to him. This has brought under observation practically every grower of and dealer in nursery stock in the State, and the very first result of the preliminary inspections was a general refusal of certificates until there had been a thorough cleaning up. Thousands of trees and shrubs unfit for sale were taken out and destroyed. Nurserymen hunted scale as they had never hunted it before and burnt left-overs in whole blocks.

On the second inspections quite a number of certificates could be given; but many were yet refused and this brought matters to a focus. Some of the nurserymen asked me to have their trees weeded out and sorted, and I secured the services of Mr. H. H. Brehme who has assisted me in other lines, for this purpose. Several thousand more scaly peach trees were thus thrown out, and it is a fair statement that fully 50,000 scaly trees were destroyed that would otherwise have been foisted upon New Jersey orchardists; and the end is not yet, for though sixty-two certificates have been thus far issued, there are yet nurseries containing nearly 200,000 trees that are uncertified and kept under observation. It would be too much to expect for this first year that no uncertified trees will get upon the market; but they will stand a very good chance of being discovered when a systematic orchard inspection is made.

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It is a fact that the San Jose or pernicious scale is quite generally, though by no means universally, distributed throughout the State. Of course that is no reason why our fruit-growers are not entitled to clean trees when they set out new orchards; but in a neighborhood where the insect is generally distributed a little scale is bound to get on sooner or later, and the fruit-grower must be prepared to fight when it comes. Many of our growers have learnt how to deal with it and are no longer afraid. They do not mind much whether the stock they buy is a little scaly or not. In view of these conditions I have made this concession for nurseries doing a local trade only, and chiefly with peach trees. First of all, every obviously infested tree must be taken out and destroyed. Trees with single scales visible only on the outer twigs that are ordinarily trimmed off might remain. Every purchaser should be informed that scale had been found in the block and no tree to be sent out unless fumigated with hydrocyanic acid gas. Growers were obliged to agree to this in writing, and they were advised to obtain from purchasers a written statement that they knew the stock to be "fumigated" and from a probably infested block.

I also secured for some of our nurserymen who had made sales in other States, the consent of the inspecting authorities in such States to the admission of suspicious stock when properly fumigated. Of course, in all these cases I made certain that a proper fumigating outfit was on the nursery.

In this way I have tried to be fair to the nurseryman and just to those who purchase from him. A purchaser who feels himself quite able to deal with the insect, and buys with his eyes open, should be allowed to do so. Fumigation properly done is an almost certain cure for pernicious scale on slight-infested trees; but as there is always danger of a slip, due to carelessness, fumigated trees can never be quite equal to clean trees in actual practice.

Where a nursery is in an infested region the nurseryman is, to a large extent, at the mercy of his neighbors. A few infested orchard trees may render a block of 50,000 nursery trees half a mile away unsafe, and may cause material loss to the nurseryman. Where the latter is held to so strict an accountability, he has a

fair right to demand that he be protected against the criminal carelessness of his neighbors.

This brings me to another important point. According to the common law a man may use his own property as he pleases, *provided* that he does not thereby injure his neighbors. If he does that he renders himself liable to an action for damages, and the law-making body has at all times the right to make any unjustifiable use a criminal offense.

A man, therefore, may have an orchard dying from San Jose scale or any other pest, and, so long as he threatens no one else, he must be let alone to bear the burden of his folly in neglecting to fight it. But if such an orchard is next to a nursery block, or next to an orchard recently set out and free from scale, the proviso would apply, and the owner of the infested trees could be held for damages in a civil suit. As a matter of fact, few, if any, such actions are ever brought, and neighbors take it out in growling at each other to the Entomologist.

But the new law does not affect the nurseryman only; it gives control also over the orchardist when there is a necessity, and there have been a number of demands that this power be exercised.

I have always acted upon the theory that most men were willing to do the right thing when it was for their advantage to do so; therefore I have never begun proceedings with a threat. I have preferred in all cases, after making sure of my facts, to courteously notify the owner of the trees complained of, suggesting their treatment, and in every case thus far the infested stock has been either cut down or treated. This is really an excellent record, because, though the actual number of cases dealt with has not been very large, they have come from widely separated parts of the State, and men of quite different character have been among those affected.

The full amount of the appropriation—\$3,000—has been available since November 1st, 1903, only; but already I have started a systematic investigation of the orchards in two nursery districts. The Executive Committee authorized the employment of a special deputy for this purpose, and at the present time data are at hand for some one hundred orchards, large and small, cov-

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ering an area over two miles from a given centre. This inspection will be kept up during the winter and perhaps well into spring. The inspector is instructed in all cases to see the owner first, to explain the object of the inspection and to make it entirely clear that the purpose is to help him, not to prosecute nor to demand unreasonable practice. The response has been excellent; most men have learned of the scale by this time, and most of them are very ready to be directed as to what they should do. Dead and dying trees are powerful persuaders, and we meet with few people now-a-days that need much argument to convince them that it is poor policy to keep trees that cumber the land without producing revenue.

It is the general object to bring the fruit-grower into harmony with the office; to give him confidence in its methods and in its objects. The time has come when we can recommend practice confidently, and can assure results if directions are followed.

Throughout the Eastern United States the lime, salt and sulphur mixture has been tested as against scale insects during 1903, and the wash in its varying combinations is now better known than ever before. It can be made without boiling and, on a small scale, with very little trouble, though for orchard work where many trees are to be sprayed the boiled wash is yet the best.

In November I attended a meeting of the Official Horticultural Inspectors, at Washington, D. C., and in the general discussion learned at first hand of the results of work done in all the Atlantic States where insect laws are now in force.

Really pertinent here is a record of the fact that a large number of the Asiatic lady bird, *Chilocorus similis*, has been bred at New Brunswick and that colonies have been distributed at a number of points in the State. Arrangements have been made also to secure additional colonies next spring, and it is hoped to secure a representation great enough to test definitely the usefulness of that species under our conditions.

It is believed that as matters stand now, material progress can be made in controlling not only the pernicious scale, but injurious insects generally. It is also believed that the strict inspection of nurseries will secure better stock for the grower. It would seem to need little argument to prove that a healthy well-grown nursery

tree makes a better orchard tree than a cull; nevertheless some orchardists seem content to lose a considerable percentage of their planting as well as a year or two of growth by setting stock that ought never to be allowed to get out of the nursery.

A Member—Mr. Chairman, I would like to ask the professor if he knows anything about this caustic soda wash which has been published for the last month.

Dr. Smith—I don't like to say what might happen in California under their conditions, but I know in our State it has been the custom to wash trees with caustic potash and caustic soda, and mixtures have been applied one pound of caustic potash in one gallon of water, and a large amount of scale has been killed. But I don't think it is going to be as effective as the lime and sulphur wash. I would not advise anyone to rely upon it until it has been tested in our own State. I may say tests will be thoroughly made during the coming winter.

Education and the Farmers' Institute Work in Ontario, Canada.

BY DR. JAMES MILLS.

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Education and the Farmers' Institute Work in Ontario, Canada.

BY DR. JAMES MILLS.

MR. PRESIDENT, LADIES AND GENTLEMEN—The first thing I want to say to you to-day is that in every line of activity that leads to any practically useful issue the most important factor is the man. Splendid natural resources, fine buildings, fine equipments, splendid systems of railroads, good markets and all the rest of it count for a good deal, but not nearly so much as the man. The man everywhere and always is the chief factor in progress on every line.

Now, is it not so in commercial industry and professional life, in the counting house, in the banks, in the joint stock companies, in the factory, on the railroad, in the school, in the college? And what you will accomplish on these farms of yours in the State of New Jersey will depend to some extent upon your natural resources and your climatic conditions and your market, but far more on the kind of men you have on these farms.

So I do not hesitate to say that the great problem for us as individuals and for legislatures, is what can we do to raise our men to a higher level, physically, mentally, morally and esthetically, or in a narrower sense, what can we do to improve the industrial qualities of our men, old and young, in order that they may be more intelligent, progressive, and may work successfully in the lines of life in this country, on the farms as well as elsewhere.

Now this, as you will see, gets at the very core of production, and it involves the whole question of education, general and special.

I see that you, as well as we further North, have spent large sums, and are spending large sums for education of the general and academic kind. I have nothing to say against academic education, nothing to say against public schools or against high school education. We have spent great sums of money, sometimes with doubtful results, but we have not done much on special education in America yet.

What should determine the education that any people ought to have? I take this ground, and I think you will take it with me, two things, "function" and "environment." Answer the question, what are the majority of our people going to do in after life, what will be the functions they will have to perform, the majority of them, and what are going to be their surroundings in life, and then I will tell you the kind of education they ought to have.

I say we have spent large sums of money on general education, and have you ever noticed what many of the farmers are doing on their farms in the education of their families. They wisely spend a considerable sum in giving their daughters a good public school and generally a high school education; and some go further, they work hard, save all they can, and pay handsomely to educate those boys who are going to be lawyers, doctors, dentists or preachers or something of that kind. But the boy who has decided to stay at home and work on the farm, what do they do for him? In nine cases out of ten they let him grow up in comparative ignorance. What does that mean to that boy that has stayed by their side, who has done the hard work, early and late; what does it mean? It means that in spite of himself he will be a hewer of wood and a drawer of water for his brothers who have been educated in the professions, and his father and mother have arranged it so, all through this country.

Now, I say that is not fair to that boy. You cannot make farmers of all your boys. I do not ask that, although I am president of an agricultural college. Not all of them have the taste for agriculture. Nor do they all have the ability that will make them successful as farmers, for it requires a certain kind of ability to make a good farmer, just as sure as that it requires another kind of ability to make a good lawyer, or a good doctor,

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or a good politician. There are some of your boys who are bright and have the ability to farm; have them stay at home on the farm. But deal fairly by those boys. Do not let them grow up in ignorance and then give them the farm, or what is left of it, after paying off their brothers and sisters. Give them a chance as well as the rest of the family, even if you give them ten acres less when they start life on their own account.

Now what are we doing for the education of our daughters? In our country we haven't done very much. Their education, rich and poor alike, pretty much, is as though they were all going to be ladies of leisure, with servants to do their bidding, after they commence housekeeping on their own account. They start to school at about five years of age and work all day in school, and they are not very long at it until they have some night work, and thus their time is taken up until they are fifteen or sixteen years of age, studying in the daytime and studying at night, and then, perhaps, they take a teacher's certificate and teach school for a while, and then they marry somebody, and then I say God help the poor woman, and the husband and the children that she looks after.

Some of these women become splendid housekeepers, but the majority of those who go through that training have not had any training in housekeeping, and that does not come by instinct, any more than the ability to run a farm. The prospective housekeeper has just as difficult work and requires just as careful training that all the work of our best teachers can give her, just as surely as the man that goes to the agricultural college. There is no doubt about that.

Go up the back streets of this town in summer, or in your larger cities, glance into the halls, and look into hundreds and thousands of homes, and ask yourself what those girls in charge of those homes most needed when they were at school. Whether unfortunately or fortunately, most of our girls have to do a large share of their own work. I ask you what you think these girls needed most when they were at school. Was it history, literature, rhetoric, Euclid, algebra, or any of these things, good in themselves, or would it not have been better to ground them well just in the elements of English education and give them some hints

and suggestions about cleanliness and housekeeping and the art of cooking? Don't you think so?

I think we must face about and think over that proposition, which, I will state, is not original with me, but comes from the president of Harvard, that education ought ultimately to be determined by two things, "function," what are your pupils going to do, and "environment," and if there are any people who ought to hold up their hands for this practical style of education, it is the poor people, not the rich, but the poor people.

If you have a fine house and elegant carpets, and beautiful draperies and so on, very commonplace housekeeping will make a pretty good showing. You know that. But put a woman into a house with a bare floor, or perhaps an odd rug on it, a few chairs, a plain table and a cooking stove, you will then see what good housekeeping is or the lack of it.

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The farmers' institutes are furnished for the farmers of the country, something very simple, very direct and very practical in the way of education. It is a sort of college extension work, and I do not know of anything else, although I am at the head of a college, which is worked so directly and so effectively in our country for the immediate benefit and the ultimate uplifting of the farming community. I don't know of any other organization well handled which approaches them so directly. Just as Governor Hoard said yesterday, if you will tell a man a certain thing over a fence, he will listen to you, but if you put it in print, he won't read it, and he may be a good man, too. We all have our peculiarities, and it is no wonder that the farmer has his as well as other people. They say lots of things about farmers that have no foundation. (Applause.)

I say the institute furnishes the farmers with valuable information, and it brings them together. That is a great thing in institute work, bringing them together and assisting them in comparing experiences. That is the way they learn from one another. It leads them to observe more closely than ever before. Begets

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in them a desire to read and causes them to think of what they have observed and read. That I believe to be the aim of the institute in our country, and I presume in yours the aim is largely the same as it is with us.

Our institutes were organized seventeen or eighteen years ago in a very simple way. They began in our college, as nearly all the agricultural movements in our province began, and that is where they ought to begin. But you can't expect them to begin in the agricultural college if you are not back of it with your sympathy and your financial support. A good college means much money. You may run a one-horse college with a little money, and you may spend a great deal of money and still have a one-horse college, but you never can have a great college without considerable expenditure of money, because good men cost money. Although sometimes a good man will stay for less than he is worth for a short time, yet you cannot expect him to stay long and do his best unless he receives just compensation, and every college in every State should inspire the farmers and lead them in every enterprise that is likely to benefit the farming community.

We started with \$300 and twelve meetings. I went as the head of one deputation, taking two professors with me. My farm superintendent went as a head of another and took two with him. The first deputations were all college men, but we tried to put with them some practical men.

Well, we held twelve meetings, that seemed to please the locality in which we met, but there were no organizations. We did our best; we boarded ourselves and worked for nothing.

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The Government then passed an act and said to every electoral district, and we have about one hundred in the province of Ontario, they said to the farmers, if you get at least fifty men who will pay twenty-five cents per year, that would be \$12.50, and get \$25 from your County Council, or one of your Township Councils, if you prefer, in your district, then the Government will

give you \$25. You see that gave us \$50, and the \$12.50 for membership fee made it \$62.50, to start with. That was to be used for the necessary printing and advertisements of the meeting, paying for halls, heat and light, and some expenses the secretary would have. That for the beginning. Then the Government sends statistics free of charge for the winter meetings and a delegation of speakers. We first sent a delegation of three, now we send two. First they were all college men, and then there were college men and picked farmers, whom we had found in our work, men whom we could rely on; some were members of Parliament and some not. You know it is a hard thing to get a good practical farmer to do much talking. In our country the ability to talk well on agriculture is too often in the inverse ratio of the practice at home. Farmers will listen to men who are successful at home, no matter about the grammar, if he can get out the facts, picked up by home experience.

You know the successful farmer is a good deal like a class of people whom I respect profoundly because I was brought up among them. That is the people we call the Quakers, the only people in this country who practice more than they preach. They don't preach much, but their practice is fine. But with the rest of us we preach a lot, and I would not say so much for the practice.

The farmers at the institutes have helped the professors out. If he is not good at writing papers or making a speech, if he is sound on answering questions, after a while he will become good at writing papers and making good speeches. I could name some of the very best men in our country who grew up that way, and now are prepared to speak in a simple, plain way before an audience.

We go out on special occasions to keep in touch with the farmers, for it never does to forget your constituents altogether even if one is not a politician.

The institutes are now manned by the farmers of the province of Ontario, and they are doing a grand work. Now, as to women's institutes: We sent out some lady speakers to the men's meetings, and the men were charmed. I think the ladies were the best speakers we had, but a difficulty arose. Often the men

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wanted to discuss practical questions about stock-breeding, etc., and they had too much sense to annoy the ladies by discussions of that kind, and they were excluded.

So Mr. Creelman, who is our Director of Institutes, said the remedy is to organize women's institutes, and now we have over fifty women's institutes. He arranged them as far as possible to have the men and women meet at the same time and in the same place, in separate rooms during the day, where each division could discuss their own questions freely, in the privacy of their own rooms, and say things that it would not be proper to say in a mixed audience, but still things that ought to be said. And we are quite pleased with our ladies' institutes. Then at night bring town and country together—and you must do that if you would succeed in this work, for we are one people—and the town people respect you if you have a good meeting.

At the night meeting the women and men work together splendidly, because the women can talk on many subjects that are interesting to a village. They talk about flowers and window gardening, and the management of the home and the secret of successful housekeeping, and about how to decorate the walls, and the proper blends in colors in carpet and paper. And the men, these hard-handed fellows are interested in those things, and they talk on subjects that are suited to both ladies and gentlemen, and you have a combination that is very satisfactory for the evening session.

I said at first we had twelve meetings and \$300. I will talk a little about the method of organization. I think we have one hundred electoral districts, that is, 100 members of our local legislature. The number of meetings last year was 837. The paid-up membership, 23,754.

We know the paid-up membership because the name of every member is sent to the Superintendent in Toronto, and that member gets all the reports published by the Department of Agriculture, and by all the live-stock associations and other associations, that bears directly or indirectly on agriculture, sent free to his own post office, and all the agricultural college reports, some twelve or fifteen reports worth three to four dollars, go free as

issued to every member of the Farmers' Institute. You see it becomes worth while to become a member of the institute.

The Government publishes, I believe, about 50,000 copies of our report and all our bulletins that we issue, and they go to every member of the institutes. If the farmer wants to keep in touch with what is going on in his own province he becomes a member.

The head of each deputation is required to count the attendance at every meeting, and the number of persons who attended at these meetings in the province or the State of Ontario was 126,459. The amount of money spent at our institutes last year was about \$12,000, including the superintendent's salary. And I may say now that our superintendent, and these men that can do farmers' institute work, are valuable men. With us the superintendent arranges all dates of meetings, and each institute is allowed as many meetings as they desire. The department pays all expenses for two meetings in each institute district, including the wages of speakers, and the wages of speakers alone for four more meetings in each district. When these six meetings have been provided for each institute pays its own way.

During the past four or five years the institutes have made money by running excursions to the Agricultural College during the month of June, the railways allowing the institute a small rebate on each ticket.

During the past year twenty-seven institutes held ten or more meetings, the highest number held by one institute being twenty-six. Twenty-seven institutes have each a membership of more than 300, the highest being 848. From that the number runs down to the minimum required to get the grant, viz., 50.

Each year requests are received for more meetings; each year the membership increases, and each year more interest is manifested in the work. We are using more charts and more models than ever before.

I saw a statement the other day asking Secretary Wilson, in Washington (the best man you ever had in the Department of Agriculture), this question: "Is there anything under heaven that you are not willing to do to please the farmers?" That is, any investigation which you are unwilling to undertake in any part of the country. I am glad to see that, and our governments are

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beginning to realize that when they are investigating these great problems and trying to solve them for the farmer, they are helping themselves as well as the farmers of the country. There is a general uplifting, a great deal is being done for the farmer. But we are now beginning to inquire if it is not time that we do something to help the farmers' wives. You know as I know, that the home is the foundation of the State, and the most important factor in the home is the woman in charge of it. Don't any of you be fooled on that.

Are we doing what we can do, and what we ought to, to train our daughters in the art of home-making? I looked over a list of papers and discussions by these women institute speakers in our province, and I said those are good subjects, they bear directly upon the art of home-making, and we have some women who can speak on the subject of successful home-making. And we need this, because bright, cheerful, well-regulated, God-fearing homes will send out a class of boys and girls that will do vast good wherever they go over the country. And a neglected home will do just the opposite.

Therefore, we think our women's institutes are a step in the right direction. And we are fortunate just now in having had a gift of \$175,000, from a wealthy man in Montreal, to start a new department, to erect and equip two buildings located close by the college, to give instruction and practical training in domestic science, nature study and manual training.

About this so-called domestic science, we are not all agreed that that is the right name. It used to be spoken of as domestic economy, then as domestic science, now as household science and as household economics, and as home economics. We have now decided on the name home economics—we like the word home—and we have divided it into these branches: domestic science, including cooking, laundry work and general housekeeping; domestic art, including general sewing, dressmaking, millinery and home decorations. These names express the chief function of the several branches.

In the McDonald Institute we have two large kitchens, twenty-four girls will go in each, and they will be taught practical cooking. Then we have a practicing room, where they will not be

under such close supervision of the teacher. They will be put there to do certain things which they have heard about, or have done on a smaller scale in the kitchen or class-room. We have attached to that a small dining-room, where the girls will be taught to set tables properly and how to wait on them. After that we propose to give them a new wing, on a flat, similar to a workingman's house, consisting of a kitchen, a dining-room, a small bath-room and two bed-rooms. The leading member and her first assistant will occupy these two bed-rooms and will board in that dining-room, and the girl, when she has learned what we intend to teach her in the other wing, will have to go there and take charge for a week or more; she will have to go to the market and buy the food; she will have to see it delivered, prepare, cook, and serve it, looking after the apartments meanwhile, with another girl to assist her, and the girl who is assistant this week will be mistress next week, with a new girl to assist her. And her success will depend upon the character of her work and its cheapness.

You know it is an easy thing here just as it is in housekeeping, if you have got lots of everything and don't care about cost, you can make a pretty good showing; but if a girl can give you four good meals for twenty-five cents, and make them palatable, then we should say she is a success. We put her in the first class. She will be a girl that it will be worth while for a boy to look after. One who can take a commonplace house, with plain furniture and small supplies, and make things bright and happy and comfortable. You have all seen it done, and it can be done, it just wants the training and schooling. Do not come to the conclusion that the art of housekeeping comes by intuition any more than the art of farming, or the art of practicing law or anything else. You will have plenty of work to do in the institutes. You know it is hard to induce those fellows that howl against book-farming to come here, but go to them with your institutes, right to their school houses, and to their back neighborhoods, meet them and talk to them, and don't put on any airs, and then they will listen. You are working here to lift the farmers. We feel in our country the farmers are the back-bone and the sinew of the country in every respect, and that is true in every great country. There is

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reason for it, because the farm is the best place in the world to raise the best type of boys and girls, and such a crop is the best that any country can produce.

I came to the conclusion, some time since, that taking the farmers as a class, they don't take a second place to any other class of people, wherever you find them, in these two things, mental strength and moral stability. Where do your leaders in literature, science and art, in commerce, industry and in the professions come from? With us they come generally from the farmers of the country. I say that goes to show that there is mental strength and moral stability developed among the farmers. Some of the boys who are brought up on the farms go to the city and fail, but as a rule you can count more on the boys who are brought up on the farms of the country. I have great faith in the noble occupation, and you cannot do too much to uplift it. (Applause.)

Report of New Jersey State Grange

BY GEORGE W. F. GAUNT, W.M.

Report of New Jersey State Grange.

BY GEORGE W. F. GAUNT, W.M.

MR. CHAIRMAN AND GENTLEMEN OF THE BOARD—During the year past the Grange of this State has increased its membership more than any other year since the early seventies. Our order has been firmly planted in the counties where the Grange was unknown, and is recognized as an important factor in promulgating a higher type of citizenship among the agricultural classes. Communities that have never exhibited any interest in Grange work are now fast falling into line, and we trust this interest will not abate until every agricultural township in the State shall have a Grange firmly planted within its borders. In every section where a live, up-to-date Grange exists there we find a better and more intelligent class of farmers. Having gone into these new territories and planted the Grange banner, it is necessary for the new organization to be ever watchful that their enthusiasm shall continue and they shall grow in usefulness to the communities in which they are situated.

Co-operation is a fundamental Grange principle. We believe in meeting together, talking together, buying and selling together, and in general working together for mutual protection and advancement. To do this successfully we must understand and have confidence in each other. Circumstances must determine to what extent and in what ways we can best put to practice this principle. It has been thoroughly demonstrated in our State what can be accomplished by co-operative effort. We have as a result a Grange Fire Insurance, now twenty-three years old, which is the cheapest, best and safest in the State. It speaks well for the management of the Farmers' Reliance. The members in some of the counties in the State are saving annually many thou-

sand dollars in the purchase of fertilizers alone. The farmers of our country are producing a large amount of its wealth, and are realizing less in proportion to the capital invested than manufacturers and commerce. Therefore, it devolves upon the Grange to inaugurate a system to correct these methods, so that in the sale of the products and the sale of the supplies for the farm, equitable condition in price will correspond with those engaged in industrial or mechanical pursuits. To accomplish this successfully a co-operation of the best business talent must be formed. I believe that the question of distributing farm produce is one which the State Grange and the State Board must sooner or later take into consideration.

Education is essentially the foundation of all advancement; this subject is ever prominent in the work of our order. Through the means of education in its broadest sense the Grange seeks to accomplish its highest mission by giving to the farmers and their families opportunities for social and intellectual culture, and by exerting the combined power and influence of its thousands of members to secure for all their rightful share in the opportunities, pleasures and comforts of life. We are interested in everything truly educational, but especially in regard to the agricultural classes. Directly interested in this great basic industry, and being the only really representative organization to guard its interests, it would seem that we ought to give much thought to this problem of agricultural education. Wonderful changes have taken place in the world of business, art and invention in a comparatively brief period, and all this has its influence. The same ability and skill exerted years ago will not to-day bring the same returns in comparison with the needs and requirements of modern life, which, with its comforts and privileges, should be enjoyed by the farmer and his family to a reasonable degree the same as by other classes. This has logically brought to our minds the fact that better training, superior skill and ability in our business must precede better returns from our business, and the question at once presents itself, how shall we obtain this necessary skill and training? The answer can only be through special education and training for our business. Other classes have long taken advantage of special training and preparation, and the farmer who

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expects to win success in the future must do the same. It is true that the early life of the boy on the farm will give some of the training in the practical way that is necessary to success, but the intellect, the centre of power and skill, remains too largely undeveloped, and lack of power to grasp and comprehend the varied and complex condition of modern agriculture results. The trained mind and the skilled hand together is the combination to win success under present conditions. Our order has a grand work before it to try to shape public sentiment that it may come to realize the independence of all classes, that it shall recognize ability, skill, culture and character as the requisites of true nobility, whether one tills the soil or earns his bread by other honest labor. Agriculture as a profession or business should rank side by side with other professions or lines of business; this can only be accomplished by being equal in ability, culture, refinement and education with them.

Officers of the State Grange of New Jersey, P. of H., 1904.

Master, GEORGE W. F. GAUNT,Mullica Hill, Gloucester county.
Overseer, EDWARD DUDLEY,Medford, Burlington county.
Lecturer, GEORGE L. GILLINGHAM,Moorestown, Burlington county.
Steward, WINFIELD S. BONHAM,Shiloh, Cumberland county.
Assistant Steward, J. H. M. COOK,Caldwell, Essex county.
Chaplain, REV. LEVANUS MYERS,Alloway, Salem county.
Treasurer, CHARLES COLLINS,Moorestown, Burlington county.
Secretary, H. F. BODINE,Locktown, Hunterdon county.
Gate Keeper, E. N. STRONG,Ringoos, Hunterdon county.
Ceres, GEORGIA A. DUELL,Woodstown, Salem county.
Pomona, ELLA VANAMAN,Dias Creek, Cape May county.
Flora, LOUIE CHEW,Sewell, R. F. D. Gloucester, county.
Lady Assistant Steward, LAURA E. STRONG,Ringoos, Hunterdon county.

EXECUTIVE COMMITTEE.

GEO. W. F. GAUNT,Mullica Hill, Gloucester county.
 ALBERT HERITAGE,Mickeltown, Gloucester county.
 NICODEMUS WARNE,Broadway, Warren county.
 JOHN T. COX,Readington, Hunterdon county.
 A. E. HEDDEN,Verona, Essex county.
 H. F. BODINE,Locktown, Hunterdon county.

State Grange meets first Wednesday in December, 1904.

POMONA GRANGES.

MASTERS AND SECRETARIES, WITH ADDRESSES.

1. Burlington—*Master*, CRESSMAN DARNELL,Medford, Burlington county.
Secretary, GEORGE L. GILLINGHAM,Moorestown, Burlington county.
3. Hunterdon—*Master*, DAVID H. AGANS, Three Bridges, Hunterdon county.
Secretary, SAMUEL JOHNSON,Quakertown, Hunterdon county.
4. Cumberland—*Master*, GEO. W. MITCHELL, ..Vineland, Cumberland county.
Secretary, L. F. GLASPEY,Shiloh, Cumberland county.
5. Mercer—*Master*, R. C. WALN,Allentown, Monmouth county.
Secretary, W. N. CUNNINGHAM,Hightstown, Mercer county.

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6. Salem—*Master*, L. BORTON, Woodstown, R. F. D. No. 1, Salem county.
Secretary, CARRIE R. ATKINSON, Woodstown, Salem county.
8. Gloucester—*Master*, JOHN C. HERITAGE, Mickleton, Gloucester county.
Secretary, JOHN TONKIN, Glassboro, Gloucester county.
9. Centre District—*Master*, H. F. HARRISON, Caldwell, Essex county.
Secretary, CHAS. E. BRYER,, Hanover, Morris county.
10. Warren—*Master*, N. WARNE, Broadway, Warren county.
Secretary, J. M. MACKEY, Phillipsburg, R. F. D. No. 2, Warren county.

COUNTY DEPUTIES.

Bergen and Passaic—E. M. PELL, Ridgewood, Bergen county.
 Burlington—EDMUND BRADDOCK, Medford, Burlington county.
 Cumberland—ROBERT PEACOCK, Deerfield, Cumberland county.
 Camden—JOHN M. GARWOOD, Haddonfield, Camden county.
 Cape May—A. T. D. HOWELL, Dias Creek, Cape May county.
 Essex—BENJAMIN DE CAMP, Roseland, Essex county.
 Gloucester—AARON B. SOMERS, Mullica Hill, Gloucester county.
 T. WOOD WYNE, Thorofare, Gloucester county.
 Hunterdon—W. W. LAMBERT, Sergeantsville, Hunterdon county.
 Mercer—THEO. CUBBERLEY, Hamilton Square, Mercer county.
 Morris—CHARLES E. BRYER, Hanover, Morris county.
 Monmouth—FRANK W. POTTER, Imlaystown, Monmouth county.
 Middlesex—ARTHUR E. PERRINE, Cranbury, Middlesex county.
 Salem—CLARK FLITCRAFT, Woodstown, Salem county.
 Sussex—RICHARD M. HOLLY, Sussex, Sussex county.
 Union—WM. DUBON, Elizabeth, N. J.
 Warren—NICODEMUS WARNE, Broadway, Warren county.
 Somerset and Ocean—THOMAS Q. TAYLOR, Hamilton Square, Mercer county.

SUBORDINATE GRANGES.

GRANGES.	MASTERS AND ADDRESSES.	SECRETARIES AND ADDRESSES.	LECTURERS AND ADDRESSES.
Hammonton,	A. J. Rider, Hammonton, Atlantic co.,	A. J. King, Hammonton, Atlantic co.,	M. C. Butler, Hammonton, Atlantic co.
Swedesboro,	Samuel L. Homan, Swedesboro, Gloucester co.,	Caddie J. Gill, Swedesboro, Gloucester co.,...	E. Nettie Crispin, Bassett, Gloucester co.
Moorestown,	Chas. B. Jessup, Riverton, Burlington co.,	Carrie B. Zelle, Moorestown, Burlington co.,.	S. Lucy Satterthwaite, Moorestown, Burl'n co.
Woodstown,	Samuel H. Moore Woodstown, Salem co.,	Carrie R. Atkinson, Woodstown, Salem co.,..	Ella B. Moore, Woodstown, Salem co.
Vineland,	Charles Chalmers, Vineland, Cumberland co.,...	Ann Chalmers, Vineland, Cumberland co.,....	Mrs. C. M. Burge, Cumberland co.
Ringoes,	George B. Hartpence, Ringoes, Hunterdon co.,	John Q. Holcombe, Ringoes, Hunterdon co.,...	E. N. Strong, Ringoes, Hunterdon co.
Hopewell,	L. F. Glaspey, Shiloh, Cumberland co.,.....	Winfield S. Bonham, Shiloh, Cumberland co.,..	Jos. Bivaus, Bridgeton, Cumberland co.
Cumberland,	Henry Bacon, Greenwich, Cumberland co.,....	M. H. Goodwin, Greenwich, Cumberland co.,..	Anna T. Goodwin, Greenwich, Cumberland co.
Penwick,	John W. Finlaw, Harkersville, Salem co.,....	Anna E. Harris, Harkersville, Salem co.,.....	Abbie Harris, Harkersville, Salem co.
Harrisonville, ...	Lewis M. Morgan, Woodstown, Salem co.,....	M. Ella Jones, Mullica Hill, Gloucester co.,...	Belle Kirby, Harrisonville, Salem co.
Elmer,	John M. Woolman, Elmer, Salem co.,	Otis H. Elwell, Elmer, Salem co.,	Mary W. Gaunt, Elmer, Salem co.
Bridgeport,	S. Lewis Killie, Bridgeport, Gloucester co.,....	Frank Holdcraft, Swedesboro, Gloucester co.,..	Anna Holdcraft, Swedesboro, Gloucester co.
Medford,	Arthur E. Prickett, Medford, Burlington co.,...	Anna E. Kirby, Medford, Burlington co.,.....	Sarah J. Dudley, Medford, Burlington co.
Haddon,	Amos G. Haines, Ashland, Camden co.,	R. Lewis Shivers, Camden, Camden co.,	Lizzie Stafford, Ashland, Camden co.
Mantua,	John Lyons, Wenonah, Gloucester co.,.....	Hiram S. Leap, Wenonah, Gloucester co.,.....	Clara Eachus, Barnesboro, Gloucester co.
Windsor,	J. F. Hutchinson, Windsor, Mercer co.,	J. F. Meeker, Windsor, Mercer co.,.....	Mrs. Ella B. Rogers, Windsor, Mercer co.
Hope,	W. N. DuBois, Bridgeton, Cumberland co.,	P. L. Wheaton, Bridgeton, Cumberland co.,...	Edward Perry, Bridgeton, Cumberland co.
Pemberton,	Geo. W. Lundy, Birmingham, Burlington co.,..	H. R. Lippincott, Pemberton, Burlington co.,..	Mrs. J. Forsythe, Pemberton, Burlington co.
Mullica Hill, ...	G. H. Horner, Sewell R. F. D., Gloucester co.,	Anna G. Tonkin, Mullica Hill, Gloucester co.,..	Anna G. Gaunt, Mullica Hill, Gloucester co.

SUBORDINATE GRANGES—CONTINUED.

GRANGES	MASTERS AND ADDRESSES.	SECRETARIES AND ADDRESSES.	LECTURERS AND ADDRESSES.
Deerfield,	Frank O. Ware, Deerfield, Cumberland co., . . .	L. S. Padgett, Bridgeton R. F. D. 5, Cumb. co.,	Mrs. E. Woodruff, Deerfield, Cumberland co.
Centre Grove, ..	Wm. H. Taylor, Millville, Cumberland co., . . .	John Taylor, Millville, Cumberland co.,	Jacob Zimmerman, Millville, Cumberland co.
Columbus,	W. Henry Taylor, Columbus, Burlington co., . .	Bessie E. Bunting, Bur'g'n, R. F. D. 3, Bur. co.,	A. S. Bunting, Burlington R. F. D. 3, Bur. co.
Thorofare,	Mark Clement, Woodbury, Gloucester co., . . .	Rodman, Clement, Paulsboro, Gloucester co., .	Mary R. Low, Thorofare, Gloucester co.
Courses Landing,	Harry Gardiner, Sharptown, Salem co.,	Helen D. W. Richman, Sharptown, Salem co.,	Clara Royal, Sharptown, Salem co.
Pennington,	A. H. Burroughs, Pennington, Mercer co., . . .	Ira Stout, Pennington, Mercer co.,	S. B. Ketchum, Pennington, Mercer co.
Wantage,	C. J. Stanaback, Sussex, Sussex co.,	Ida Roy, Sussex, Sussex co.,	Charles E. Stickney, Sussex, Sussex co.
Hamilton,	H. H. Hutchinson, Jr., Robbinsville, Mercer co.,	J. T. Allinson, Yardville, Mercer co.,	Miss Caroline Allinson, Yardville, Mercer co.
Friesburg,	Henry M. Loveland, Cohansey, Salem co., . . .	Henry Padgett, Cohansey, Salem co.,	Attie D. Loveland, Cohansey, Salem co.
Williamstown, ..	James Taggart, Williamstown, Gloucester co., .	Jas. M. Tweed, Williamstown, Gloucester co., .	Mrs. E. C. Ritchie, Williamstown, Glouc'r co.
Locktown,	H. H. Fisher, Sergeantsville, Hunterdon co., .	Gard. J. Fisher, Sergeantsville, Hunterdon co.,	E. M. Heath, Locktown, Hunterdon co.
Blackwood,	J. M. Stetser, Blackwood, Camden co.,	C. C. Stevenson, Blackwood, Camden co.,	Maria Stetser, Blackwood, Camden co.
Hightstown, . . .	Wm. N. Cunningham, Hightstown, Mercer co.,	Wm. N. Perrine, Hightstown, Mercer co.,	Lainattie W. Lee, Hightstown, Mercer co.
Allentown,	R. C. Waln, Allentown, Monmouth co.,	W. B. Burtis, B. 73, Allentown, Monmouth co.,	Mrs. E. G. Hunt, Davis Station, N. J.
Liberty,	H. W. Polhemus, Bradwelt, Monmouth co., . . .	R. B. Gordon, Wickatunk, Monmouth co.,	Jennie Polhemus, Bradevelt, Monmouth co.
Sergeantsville, ..	John W. Case, Sergeantsville, Hunterdon co., .	Percy W. Bush, Stockton, Hunterdon co.,	N. B. Rittenhouse, Sergeantsville, Hunt'n co.
Livingston,	J. H. M. Cook, Caldwell, Essex co.,	Wm. Deicks, Jr., Orange, Essex co.,	S. B. Burnet, Livingston, Essex co.
Morris,	A. M. Webb, Hanover, Morris co.,	Wm. A. Howell, Florham Park, Morris co., . .	Mrs. R. Sanders, Hanover, Morris co.
Kingwood,	W. J. Thatcher, Barbertown, Hunterdon co., .	E. B. Huffman, Barbertown, Hunterdon co., .	Mrs. Kate Thatcher, Barbertown, Hunt'd'n co.

SUBORDINATE GRANGES—CONTINUED.

GRANGES.	MASTERS AND ADDRESSES.	SECRETARIES AND ADDRESSES.	LECTURERS AND ADDRESSES.
7 Caldwell,	A. E. Hedden, Verona, Essex co.,	F. C. Goble, Verona, Essex co.,	C. B. Crane, Verona, Essex co.
8 Roseland,	Geo. E. DeCamp, Roseland, Essex co.,	Hattie M. Condit, Roseland, Essex co.,	Mary J. Condit, Roseland, Essex co.
9 Warren,	John S. Baylor, Broadway, Warren co.,	Mae Oberly, Broadway, Warren co.,	H. J. Beers, Stewartsville R. F. D., Warren co.
1 Mickleton,	H. J. Heritage, Swedesboro, Gloucester co.,	Walter Heritage, Swedesboro, Gloucester co., ..	Mary L. Haines, Mickleton, Gloucester co.
2 Lyons Farms, .....	.....	.....	.....
3 Pohatcong,	D. C. Donnelly, Springtown, Hunterdon co., ..	Hattie A. Donnelly, Springtown, Hunt'd'n co.,	.....
4 Hurffville,	B. F. James, Sewell R. F. D., No. 3, Glou. co.,	C. J. Davenport, Sewell R. F. D. 3, Glou. co.,	Walton H. Chero, Sewell R. F. D. 3, Glou. co.
5 Rocksburg,	John H. Young, Belvidere, Warren co.,	Warren Haerman, Belvidere, Warren co.,	Irvin Miller, Phillipsburg, Warren co.
Washington,	Samuel T. Bowman, Washington, Warren co., ..	Mrs. Jos. Bodine, Washington, Warren co., ..	Henry Race, Oxford, Warren co.
6 Oak Grove,	I. C. Robertson, Pittstown, Hunterdon co., ..	M. H. Leaver, Quakertown, Hunterdon co., ..	Mary E. Race, Pittstown, Hunterdon co.
7 Spring Mills, ...	M. W. Angell, Milford, Hunterdon co.,	Mary E. Woolfe, Milford, Hunterdon co.,	Mrs. Belle Weider, Milford, Hunterdon co.
8 Stewartville, ...	George W. Carhart, Stewartsville, Warren co.,	John C. Boyer, Stewartsville, Warren co.,	Mrs. George Hagar, Stewartsville, Warren co.
9 Aura,	David N. Hughes, Monroeville, Gloucester co.,	Jos. M. Carter, Aura, Gloucester co.,	Mrs. Martha Nelson, Clayton, Gloucester co.
Cross Keys,	Geo. Pease, Cross Keys, Gloucester co.,	Edward B. Gaunt, Cross Keys, Gloucester co.,	Richard Evans, Sr., Sewell No. 3, Glou. co.
Grand View,	Wm. Y. Holt, Flemington, Hunterdon co.,	Thos. B. Hampton, Croton, Hunterdon co.,	Augusta Higgins, Flemington, Hunterdon co.
Riverside,	John W. Opie, Three Bridges, Hunterdon co., ..	J. S. Dilts, Three Bridges, Hunterdon co.,	John R. Foster, Three Bridges, Hunterdon co.
Delaware,	Wm. C. Addis, Delaware, Warren co.,	F. Russell Addis, Delaware, Warren co.,	James I. Cook, Delaware, Warren co.
1 Iona,	Joseph Green, Williamstown, Gloucester co., ..	Miss Ethel Marsh, Malaga, Gloucester co.,	Mrs. H. M. Russell, Newfield, Gloucester co.

SUBORDINATE GRANGES—CONTINUED.

GRANGES.	MASTERS AND ADDRESSES.	SECRETARIES AND ADDRESSES.	LECTURERS AND ADDRESSES.
8 Cape May,	Frederick Keins, Dias Creek, Cape May co.,...	A. T. D. Howell, Dias Creek, Cape May co.,...	Laura S. B. Howell, Dias Creek, Cape May co.
9 Bergen,	C. C. Basley, Maywood, Bergen co.,	John C. Banta, Ridgewood, Bergen co.,	Mrs. D. P. Pulis, Ridgewood, Bergen co.
0 Franklin,	George B. Fox, Wyckoff, Bergen co.,	Mrs. Alice Yeoman, Wyckoff, Bergen co.,	Lewis S. Van Blarcom, Wyckoff, Bergen co.
1 Rancocas,	Tylee B. Engle, Bougher, Burlington co.,	Nancy M. Leeds, Rancocas, Burlington co.,	Ilanna D. Engle, Mt. Holly, Burlington co.
2 Cold Spring, ...	J. P. MacKissic, Cape May, Cape May co.,	H. S. Hoffman, Cold Spring, Cape May co.,	Mrs. M. Bate, Fishing Creek, Cape May co.
3 Hickory,	Wm. Hackett, Mt. Pleasant, Hunterdon co.,...	Anson B. McCrea, Pattenburg, Hunterdon co.,...	F. O. Godown, Pattenburg, Hunterdon co.
4 Vernon Valley, ..	T. B. Storms, McAfee Valley, Sussex co.,	A. E. Rutherford, Vernon, Sussex co.,	Lewis R. Martin, Glenwood, Sussex co.
5 Ramsey,	Jas. D. Carlough, Ramsey, Bergen co.,	William F. Halstead, Ramsey, Bergen co.,	Dr. C. P. Deyoe, Ramsey, Bergen co.
6 Lincoln,	John F. Boman, Westwood, Bergen co.,	Charles L. Baim, Westwood, Bergen co.,	Wm. H. Bounn, Westwood, Bergen co.
7 Mountain View, ..	Theo. M. Roe, Branchville, Sussex co.,	Jacob Vanauken, Beemerville, Sussex co., .....	.....
8 Berlin,	A. H. Hurff, Berlin, Camden co.,	X. F. Ottiger, Berlin, Camden co., .....	.....
9 Montague,	Oscar C. Vanauken, Port Jervis, N. Y.,	Mrs. Mary O. Rundle, Port Jervis, N. Y., .....	.....
0 Upper Township, ..	Edward D. Benley, Tuckahoe, N. J.,	W. S. Shaw, Tuckahoe, N. J., .....	.....
1 Paskack,	Edw. Y. Lyman, Park Ridge, Bergen co.,	J. J. Brickett, Park Ridge, Bergen co., .....	.....
2 Olive Branch, ...	C. C. Hulsart, Matawan, Monmouth co.,	J. E. Kuhns, Clifford, Monmouth co.,

Statistical Tables==Farm Crops.

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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,	60	20	\$0 70									
Bergen,	60			100			90			80		
Burlington,	50	25	60		10	\$0 80	25	5	\$0 60	75	30	\$0 50
Camden,	75	30	55	80	15		100	12	50			
Cape May,	50	20	62									
Cumberland,	100	40	60	90	12	75				90	30	45
Essex,												
Gloucester,	90	35	50		15	75		15	80			50
Hunterdon,	60	20	50	90	14	78	85	13	56	70	26	38
Mercer,	60	20	56	55	12	80	65	10	60	50	20	35
Middlesex,	45	10	60	100	15	80	50	10	56	100	20	40
Monmouth,	50	28	60	75	19	80	75	14	60			
Morris,												
Ocean,												
Salem,	75	30	50	90	14	85						
Somerset,	50	25	52	75	20	85	90	20	55	70	35	40
Sussex,	80		56	90	20	80	90	18	65	130	40	40
Union,	25	12½	50	60	15	85	75	18	60	75	30	40
Warren,	30	25		80	18		75	15		40	22	

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	1½	\$17 00	100	50	\$2 00		60	\$2 00
Bergen,				90			30					
Burlington,				50	1	18 00	80	50	1 50		30	2 00
Camden,				75	1½	18 00	90	75	1 60		65	1 40
Cape May,				50	1	16 00	100	25	1 60		40	2 00
Cumberland,				90	¾	15 00	100	16	1 60		70	2 00
Essex,												
Gloucester,					¾	20 00	110	60	2 00		75	2 00
Hunterdon,	60	14	\$0 62	125	1¼	15 00		29	2 10			
Mercer,				99	1½	15 00	50	42	1 65		70	1 75
Middlesex,	100			100	1	15 00	100	30	2 50		50	
Monmouth,				60	1½	18 00	100	67	1 75		50	2 00
Morris,												
Ocean,												
Salem,				100	1	18 00	100	30	1 75		75	1 75
Somerset,	50	15	50	80	1½	18 00	75	40	2 00		30	
Sussex,	105		70	120		15 00	100		1 50			
Union,				75	1	20 00	20	15	2 50			
Warren,	80	30		75	1	18 00	80	14	1 65			

FARM CROPS.

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 per barrel.	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—baskets.	Average price.	Product compared with last year—per cent.	Average yield per acre—pounds.	Average price per pound.
Atlantic,	60	40	\$2 00	40	40	\$2 00	15	25	\$1 00	90	1,200	\$0 03
Bergen,	80	80	2 50	60	5	1 50	25					
Burlington,	50			10			5	5	1 25	100	2,000	03
Camden,	70			25						100	2,000	03½
Cape May,										75		01½
Cumberland,	50		1 75	30		1 75	20		1 25			
Essex,												
Gloucester,	25			25								
Hunterdon,		20	2 40				10		1 00			
Mercer,	50	25	2 50	25						100	1,000	03
Middlesex,	50	20	2 50	25			25		1 00	100		
Monmouth,	50		2 50	15			15		1 50	100	8,000	
Morris,												
Ocean,												
Salem,												
Somerset,	50		1 50	25		3 50	15		1 25	100		02½
Sussex,												
Union,	100		2 25	30		3 00	10			100		
Warren,	50	32	1 50	60		1 20	40	50	80	90		

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

COUNTIES.	STRAWBERRIES.			RASPBERRIES.			BLACKBERRIES.			WATERMELONS.		
	Product compared with last year—per cent.	Average yield per acre—quarts.	Average price per quart.	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.	Average price per hundred.
Atlantic,	80	1,500	\$0 08	100	1,250	\$0 12	130	1,500	\$0 10			
Bergen,	35			50			100			15		
Burlington,	50	1,000	08	50	1,000	12	100	2,000	10	10	100	\$0 20
Camden,	65		08									
Cape May,	60		08							50		10
Cumberland,	75	500	03½									
Essex,												
Gloucester,										10		
Hunterdon,												
Mercer,												
Middlesex,	50			100			80					
Monmouth,	50	2,500		100	1,000		100	1,500		25	625	
Morris,												
Ocean,												
Salem,												
Somerset,	50		12	75		14	75		12			
Sussex,												
Union,												
Warren,	50		08	70		08	80		06	75		

FARM CROPS.

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 —baskets.	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	2,500	\$3 00	80	2	\$0 50
Bergen,	20			50			100			80		
Burlington,	10	20	\$0 50	10	10	50 25	100	2,000		50	5	30
Camden,												
Cape May,	10						50		8 00	75	5	25
Cumberland,	10		40				100			95	5	
Essex,												
Gloucester,	10											
Hunterdon,												
Mercer,												
Middlesex,							50	2,000		50	2	
Monmouth,	25	100		10			50			50	5	
Morris,												
Ocean,												
Salem,												
Somerset,				25		50	50		6 00	75		50
Sussex,												
Union,							30	1,500	7 00	25	7	
Warren,	40			90			90					

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

COUNTIES.	HORSES.		MULES.		COWS.	
	Total number compared with December 1st, last year, per cent.	Average price between 3 and 7 years old.	Total number compared with December 1st, last year, per cent.	Average price between 3 and 7 years old.	Total number compared with December 1st, last year, per cent.	Average price between 3 and 7 years old.
Atlantic,	100	\$150 00	100	\$175 00	100	\$50 00
Bergen,	100	..	100	..	100	..
Burlington,	100	150 00	100	175 00	75	50 00
Camden,	100	150 00	100	..	100	50 00
Cape May,	100	150 00	..	..	100	40 00
Cumberland,	100	150 00	100	95 00	100	40 00
Essex, .....	..	..	..	..	..	..
Gloucester,	100	150 00	100	..	100	50 00
Hunterdon, .....	..	160 00	..	..	..	37 50
Mercer, .....	..	..	..	..	..	..
Middlesex,	100	65 00	100	60 00	100	40 00
Monmouth,	100	175 00	100	175 00	100	50 00
Morris, .....	..	..	..	..	..	..
Ocean, .....	..	..	..	..	..	..
Salem,	100	125 00	100	125 00	105	50 00
Somerset,	100	115 00	100	125 00	100	50 00
Sussex,	100	115 00	..	..	110	45 00
Union,	100	80 00	..	..	100	45 00
Warren,	80	130 00	50	100 00	60	45 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, last year, per cent.	Average price per pound for season.	Total number compared with December 1st, last year, per cent.	Average price per head for store sheep.	Total number compared with December 1st, last year, per cent.	Average price per head for spring lambs.	Total number compared with December 1st, last year, per cent.	Average price per pound December.	Total number compared with December 1st, last year, per cent.	Average price per pound November and December.	Total number compared with December 1st, last year, per cent.	Average price per pound November and December.	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						100	\$0 08			50	\$0 12			100	100
Bergen,	100	\$0 06½	100	\$4 50	100	\$6 00	100	07½	100		110		100		100	
Burlington,	100						100	07½	50	\$0 18	75	17	50	50	50	50
Camden,	100		100		100		100	07	100		100	18	100	100	100	100
Cape May,		07					90	08	50	25	100	16				
Cumberland,							100	07	100		100		100	100		
Essex,																
Gloucester,	100	07					110	07			100	19	100	75	100	100
Hunterdon,	100	07					105	06	75	22	100	12	99	100	100	100
Mercer,																
Middlesex,	100	07	100	4 00			110	07	25	20	100	15	100	75	90	75
Monmouth,	100	06½	100	4 50	100	5 00	100	07½	50	20	100	14	100	100	100	100
Morris,																
Ocean,																
Salem,	100	06½					110	07			90	18	100	80		
Somerset,	100	07½	100	5 00	100	5 00	100	08½	50	20	110	15	100	100	100	100
Sussex,							100	07	80	16	150	09	105	100	100	100
Union,	100	06					100	07			100	10	100	100	100	100
Warren,	80	06½	60	4 00	70	4 25	90	07½	50	16	80	10	100	90	80	85

Reports of County Boards of Agriculture.

Atlantic County.

OFFICERS FOR 1904.

<i>President</i> , JOSEPH BUTTERHOF,	Egg Harbor City.
<i>Vice-President</i> , PETER H. BROWN,	Hammonton.
<i>Secretary</i> , VALENTINE P. HOFMANN,	Egg Harbor City.
<i>Treasurer</i> , FREDERICK FIEDLER,	Egg Harbor City.

DELEGATES TO STATE BOARD OF AGRICULTURE.

V. P. HOFMANN, for one year,	Egg Harbor City.
L. H. PARKHURST, for two years,	Hammonton.

BOARD OF DIRECTORS.

J. E. HOLMAN, Hammonton Shippers' Union,	Hammonton.
CHARLES KRAUS, Atlantic County Agricultural and Horticultural Association,	Egg Harbor City.
HENRY PFEIFFER, Germania Fruit Growers' Union,	Cologne
WM. G. SAALMANN, at-large,	Egg Harbor City.
WM. KARRER, at-large,	Egg Harbor City.

REPORT

BY THE SECRETARY.

The annual meeting of the Board for the election of officers and transaction of routine business was held at Aurora Singer Hall, in Egg Harbor City, N. J., on November 14th, 1903, which was but sparsely attended.

The Annual Farmers' Institute was held at the same hall and city on January 27th, 1904, with morning, afternoon and evening sessions, which were very well attended.

The subjects treated by the several speakers were suited to this section of the State, and a very intelligent interest was taken in all the questions discussed. Indeed, it was the best meeting held in this county.

The paper of Mr. John Schuster, Sr., of Egg Harbor City, is herewith presented, and also a summary of Mr. Pfeiffer's, on "Fruit Production."

The evening exercises were enlivened by choice selections of music by the Egg Harbor Amateur Orchestra. The assembled public were highly entertained by two illustrated lectures.

GENERAL REMARKS.

The season of 1903 was extraordinary in many respects. March gave us summer-like weather, the buds of all fruit trees swelled so rapidly that the first week in April found the peach, plum and pear trees in full bloom. Severe frosts followed early in April, which completely destroyed the prospects of a peach and plum crop and greatly injured the pear and grape crop. Strawberries and other small fruits were not advanced enough to be hurt to any extent, and these crops were profitable to the growers as good prices prevailed. The wet and cool summer was unfavorable for corn and truck, but favorable for grass and clover. Prices of all farm products have been high. Poultry and eggs have been higher in price than for many years. The furious storm of September 16th devastated many fine orchards and vineyards by uprooting and breaking trees and hurling the fruit to the ground. In Egg Harbor City many of the finest shade trees of over forty years' standing were uprooted and broken, so that the streets in some sections were impassable for several days.

The dry spell early in the year caused many forest fires to start and create loss in different parts of the county.

Animal diseases were more prevalent than usual. Cerebro-spinal meningitis carried off—often without warning—some of the finest horses; the total number lost in this manner will exceed one hundred throughout the county. The loss by hog cholera was still greater. Quite a number of poultry also succumbed to a fatal disease.

Many a farmer was quite unprepared for the early advent of a strenuous winter, so that many fields of round and sweet potatoes were still unharvested, owing to the incessant rains and un-

expected cold. This protracted cold weather will hamper considerably the farmers in their work for the coming season.

VITICULTURE IN EGG HARBOR CITY AND VICINITY. BY JOHN
SCHUSTER, SR.

Some of my townsmen have asked me to address you on the interesting subject of viticulture. Not being a public speaker, it was perhaps unwise on their part to have asked me or on mine in yielding to the request. Having accepted, however, I will endeavor to present some remarks concerning my allotted subject, a subject which even poets from time immemorial have not considered below their dignity to make the object of their divine art. From Anacreon and Horace down to our own Longfellow the vine, as well as love, friendship, patriotism, flowers and rolling cornfields have each been a favorite object of the poet's lyre. The vine, therefore, must be vested with an inherent quality strongly appealing to the poet's æsthetical nature. I am even inclined to believe that just this attractive quality prompted Christ to compare His adorable person not to the sturdy oak, but to the tender vine, of which man as a branch must remain in intimate connection if the higher spiritual life is to remain intact. Very delightful, indeed, is a walk through a blossoming vineyard impregnated with the sweet fragrance emitted by the vines. Every new phase of the vine during the summer, from the setting of the berries to their gathering, elicits pleasurable feelings in the heart of the vintner.

Some of my remarks will be of a general character and others will have reference to viticulture in its present condition in and around Egg Harbor City. I only wish I could enrich you with many new ideas, but I am not so presumptive as to consider myself capable of doing so, for I am speaking to men of culture, most of whom are equally and even better posted concerning the details of viticulture than I am. Men of culture, I call you, because it requires a certain amount of mental culture to appreciate the benefits of an association like yours, and your presence here is manifest proof of appreciating it. Without a cultured mind,

without normally developed mental faculties no grand results will ever be achieved by the cultivation of acres, gardens, vineyards and beehives, for although human sagacity cannot suggest to the busy bee a better way to construct its combs, yet an expert in apiculture will harvest a more copious crop of honey from his hives than his neighbor, acquainted, perhaps, with the sting, but not with the more desirable characteristics of the bees.

While not claiming a perfect knowledge of my own ego, I do claim that I know myself and my own doings more intimately than I know the concerns of other individuals, and for that reason, and not from egotism, I will begin with my first starting as a vineyardist.

More than forty years ago, when yet ignorant of the first rudiments of viticulture, my first vineyard, about one-half acre in size, was planted with the Concord, which was at that time free from disease and a prolific bearer, the fruit of which found a ready market at from eight to ten cents per pound. My knowledge of propagating vines by layers, cuttings and grafting I obtained partly by observing the methods of experienced vintners, but the greatest help to me was a manual on viticulture by Frederick Muench. I vividly remember the time when, with this book in one hand and the pruning-knife in the other, I went from vine to vine to guard against mistakes in pruning. I so strictly followed the directions laid down in that valuable treatise that I even counted the buds of the canes for fear of overtaxing them. This may seem a pedantic way of proceeding, but the result proved that for a tyro in the business it was probably the best method that could have been adopted. The professional vintner, of course, will notice at a mere glance the bearing capacity of a vine and perform the work almost automatically. In viticulture, as in other trades or professions, difficulties are conquered only by dint of hard and patient labor, as your own experience has taught you.

When a person spends brain, muscle, time and money he naturally expects some return for his activity. He may be disappointed, however, by expecting too much. The E. H. C. Vineyard and Wine Co., the existence of which may be unknown to some of you, and to which I pay my respects, will find it a hard

matter to fulfill the promises made to the shareholders of the company. Just listen: "Said company sells shares at \$375 apiece. The shareholders are told the purchase of their shares will secure the buyers a yearly income for life; that a vineyard in our district will yield as rich a crop as a California vineyard; that the money thus invested will bring 25 per cent. interest; that a vine without being renewed would retain its bearing capacity for fifty years; that tremendous fortunes have been made by viticulturists in the immediate vicinity of their land, and that total failures of crops in this district were something unheard of." This is what is stated in their pamphlets. Now, just think of it. A yearly income for life, tremendous fortunes and 25 per cent. interest on the capital invested! Those willing to buy shares must direct their applications to The Atlantic Vineyard and Wine Co., 4517 Frankford avenue, Philadelphia, Pa. I must confess, however, that those alluring propositions ought to be taken with a grain of salt.

The best way to obtain a true idea of the actual state of the present condition of viticulture in and around Egg Harbor City would be a visit to our vineyards. Such a visit would lead you to some vineyards, or rather ex-vineyards, in which rotten poles and vines in their last and evidently lost struggle for existence would furnish the only evidence to warrant the supposition that in times gone by those vineyards brought forth delicious grapes. The noble vine will not thrive without proper nursing—a truth not new to you, I know. Besides such totally deserted vineyards you would find others in a less pitiful condition, because having received from their owners enough attention to keep them from withering, but not enough to make them vigorous. You sometimes will meet people not quite dead yet, but far from enjoying what Herbert Spencer calls a complete life, because there is some disorder in their organism. The English word *starve* is derived from the German, "*sterben*," to die. Well, vines, and even man, without proper care, *starve* prematurely. I say this because I was engaged and consequently expected to talk, and not at all because I imagine that I have thereby imparted a new truth to you.

The forbidding state of the condition of the vineyards inspected thus far would no doubt excite rather melancholy feelings

in a friend of viticulture. Continuing your survey, however, you would by-and-by get a chance to behold a more cheerful view, presented by vineyards in a high state of culture, such as those belonging to our more successful vineyardists. The vines in the vineyards under proper cultivation would doubtless cause the vanishing of the disappointment excited by the desolate ones.

I hope you will not tell me that this is not the proper season to visit a vineyard, the vines being neither graced with leaves nor fruit. Such an opinion could be entertained only by an ignoramus not conscious of the fact that every vine is expected to yield two crops every season, one in the shape of fruit, the other consisting of well-matured canes to produce fruit the following season. The first crop—the grapes—yielding immediate benefit, is but too often overestimated at the expense of the other, and whenever this is the case, disastrous consequences will inevitably ensue. If, for instance, you force a vine by faulty pruning to bear thirty clusters of grapes, that ought to produce but ten, you will surely impair that vine's vitality. The eye of an experienced vineyardist will even in midwinter be able to discern whether or not a given vine has during the preceding summer matured the required amount of canes fit to bear a future crop. The condition of a vine may then be diagnosed even in January.

Why are some of our vineyards in such a deplorable condition? Among the several causes that might be adduced in reply to this question I will point out the following: First. Many of our oldest and best vintners have left this world for a better one—let us hope. They have according to their best abilities contributed their share to the promotion of viticulture in our district, and out of respect to their memories I will improve this occasion to mention the names of some of them. Removed from us by inexorable death are the following: Wild, Hincke, Heil, Bannih, Steigauf, Motz, Oberle, Fritschy, Thyron, Haeberle, Purzner, Fleischer, Meyer, Heinzelmann, Hoebel, Stephany, Theis, Sigle, Kertz, Gruner, Behns, Stroetmann, Pracht, Lurch, Born and others. Our viticultural interest has assuredly sustained a heavy loss by the demise of the citizens whose names I have just mentioned, and what makes their loss more keenly felt is the fact that most of them have left no heirs to tend to their own vineyards.

Second. Another cause detrimental to our viticultural interest was the almost total failure of crops for a number of years, before science discovered a remedy against the rot. The Bordeaux mixture was introduced in Egg Harbor City by the late Dr. Theo. H. Boysen, and after I had derived good results from it I recommended spraying in our local papers. That was about eight years ago. While spraying, of course, does not protect against early frosts or hail, its usefulness is so well established by this time that no sensible wine-grower will deny it. What a fine thing it would have been for us wine-growers if the remedy had preceded the disease of the grapes. But in this case, as in all others, the reverse is true—first the disease, then the remedy. This, I think, is not a revelation to any of you. Unfortunately it sometimes requires many years to discover an efficient remedy for a disease. Such, at least, was the case in regard to the Bordeaux mixture. In the year 1855 a German nobleman, Von Babo, published his famous book on viticulture, in which he speaks of bluestone as a specific against the blight which caused much damage at that time to grain. Bluestone had a better effect, he says, than could be obtained by an application of lime. It would be interesting, he further remarks, to try a solution of bluestone in fighting the grape disease. The ingredients of the Bordeaux mixture were known to him, you see, but only after many years the mixing of them gave us the remedy as we now have it. Scanty crops had, of course, a tendency to discourage many wine-growers to spend time and money without an adequate return, so they dug out their vines and planted berries. Some, however, persevered, and to-day are glad they did. In fact, there seems to be a better state in store for our viticulture since the success of faithful growers has induced some to lay out new vineyards, and this is the silver lining in the cloud. Third. The defective manner of feeding vines will also reduce a vine to a pitiful condition. The question of manuring vineyards is far from receiving proper attention. If hungry vines, like hungry babies, could cry or move about in search for food like animals, they would receive better fare, I suppose.

Expecting, as we do, rich harvests from our vineyards every season, we ought to treat them in return for what they give with

a liberal amount of suitable food not once in three or more years, but every year. It is simply preposterous to withhold the necessary amount of nutriment because vines are not endowed with voice or locomotion.

In spite, however, of the untoward circumstances briefly touched upon, I think I was justified in saying that the prospect for better conditions has of late become more promising. The hope for a brighter future I base on two facts: First. We have at our disposal an efficient remedy against the diseases of the vines. Second. Those of our grape-growers who sell their grapes to our local winemakers are paid the highest prices for their fruit. It is conceded by all who are competent to judge in this matter that our soil is pre-eminently adapted to viticulture, and that the quality of our grapes, especially the small-berried kinds, can hardly be equalled, much less surpassed, by any region in the United States. This may be considered boastful language, but I claim that I have not overdrawn the picture at all. Having revealed the weak points of our viticulture, as it exists at present, I see no reason why I should suppress its strong ones. Concluding, I sum up by saying: Plant a proper assortment of vines, prune them judiciously, manure them liberally, spray them methodically, and your crops will be satisfactory.

EXPERIENCE IN FRUIT-GROWING. BY HENRY PFEIFFER.

Fruit-growing is in one respect like any other business, in that it cannot be made a success without properly attending to all the smaller details. It is necessary to start right; never set a piece of land to a kind of fruit not adapted to it.

I once set one thousand Kieffer pear trees on a piece of land that seemed very well adapted to the growth of this variety, being high and dry, a heavy sand and gravel loam. The trees made a fine growth and are as productive as the best.

After an orchard is set out, it is well to plant hoed crops between the rows, and we must manure heavily enough to grow good crops and leave something for the trees. In this way we can reduce the cost of cultivating to a minimum. Severe pruning

should be practiced until the trees have become of sufficient size to bear, when the pruning should be omitted for one year to induce the trees to set fruit buds, and when the trees are well set with sound fruit buds in early spring, we must again cut back enough to prevent overbearing.

Thorough cultivation should be given at least until the middle of August; a crop of cow-peas sown at the last cultivation and left on the ground over winter will keep the falling leaves on the ground, improve the mechanical condition of the soil and supply the necessary nitrogen. We generally give an orchard a liberal dressing of fertilizer in early spring and again when the fruit is growing, and again every tree that looks hungry is fed.

We try to keep our pear trees headed so low that most of the fruit can be picked while standing on the ground. When all the fruit that can be reached from the ground is picked, we drive a wagon close along the rows and pick the balance. On a warm day we never put fruit in the storage room, but leave it out over night to cool off, and put it away early the next morning.

With strawberries we often make the mistake of planting on a too light, dry and sandy soil; while such land may do very well in years when we have plenty of rain during the picking season, yet in the average season they will prove unprofitable. Our best strawberry land in Atlantic county is yet undeveloped. These are the so-called swamps or lowlands along the water courses, or at the head of streams, lands that could be easily drained.

I never yet had a profitable strawberry patch but what was on such land. On the other hand, we must have a porous subsoil, for, if this is a heavy clay or loam, the plants will freeze out during winter and curtail the crop as effectively as a dry spell on a dry sandy soil. These wet soils in their natural state are too acid to grow anything but the wild sour grasses, generally abounding in swamps. A soil test with blue litmus paper will readily show this. Keep in soil for one-fourth hour; if blue is gone and turned into a red, the soil is acid.

Ploughing such land in fall and leaving it rough so as to get the winter's freeze, will go a great way towards improving it. A liberal coating of a good agricultural lime should be applied.

Strawberry plants should not be set early in spring on wet soil, in fact it is better to wait until the soil is somewhat warmed by the sun. After setting, cultivate at least once in two weeks. It will keep down weeds during summer, and, if the surface is drained and properly fertilized, we are almost sure to see the balance on the proper side.

On one occasion I set twelve hundred peach trees, cultivated and fertilized well. They made a splendid start, but since the trees are of bearing age I find that about one-third are unprofitable, because the orchard runs down near a swamp where the winter and spring frosts injure it. What the frost leaves the rot takes.

For several years I have had very good success with apples on trees that are about thirty years old. These trees are of different varieties and were not considered worth standing-room. I located a rich compost heap under one of them in the month of August. The next spring I used it as fertilizer, and the following fall I sold three barrels of fine apples from this tree and had enough left to supply the kitchen until January. This was an object lesson. I began feeding my other apple trees, and the result is a good crop of apples every year. That single tree produced a crop that brought \$16.70, although many were blown off by the storm.

We often hear it said that in large fields an individual tree or plant will not give the good results that are often obtained from specimen trees or plants situated in a favored spot, as in a garden; but it will do as well if given the same amount of fertilizers and care, and it will cost less.

In planting an apple orchard care should be taken to mix varieties in such a way that they will cross-fertilize in the blooming season, as most varieties of fruit—apples included—will fruit much better if set in this way than when single varieties are planted in large blocks by themselves.

Of course, we must not expect to grow perfect apples without spraying. If we examine the stem of an apple blossom with a magnifying glass before blooming, we will find the spores of the apple scab developing on the tender stems; this, if unchecked, will spread over the fruit, and if severe will cause the parts to become

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distorted and arrest growth; if less severe it will give the ripe apples a blackish, sooty appearance, that the commission men term "cloudy apples." Such fruit always sells at a discount. To check the development of this fungus, we spray the Bordeaux mixture before blooming and add arsenic in some form to reach the apple curculio at the same time; a second spraying is made as soon as blossoms have fallen, to further protect the forming fruit from this scab, and again add an arsenite to our Bordeaux mixture to reach the coddling moth; another spraying for scab and coddling moth should be made about two weeks later, then we may let the sprayer rest until we spray for scab the next winter or early spring.

The great drawback to apple-growing for the beginner is the fact that it takes about ten years, under good cultivation, to get an orchard into profitable bearing. Of course, the land can be used for other crops while the trees are small, and an orchard once set will last a lifetime, if properly cared for; whereas with berries we have to replant every two to six years.

The apple market is not likely to be overstocked, as the foreign trade will take our surplus. New York State is not marketing as many as in former years, owing to the remarkable growth of the evaporating industry there, where from three counties alone eight hundred carloads of evaporated apples were shipped last year. Even the poorest grade of apples are sliced with peels, core and all evaporated and sold to France, where "Extra Dry Champagne" is manufactured from them, and then imported by Americans and put in competition with our home product.

One of the most profitable things for me to grow is the grape. But the treatment of this subject is covered by Mr. Schuster's paper.

I have been quite successful with the Lucretia dewberry and Miller raspberry, and believe they are two things well worth growing, at least until in some future years they may be supplanted with something better. In this business of fruit-growing, the first one to take hold of a good new article generally makes a good thing out of it. While it is not advisable to go into a new thing before we try it in our own locality, it is well to keep informed by trying new varieties as they come to our notice, and

keep only the best. I have now in an experimental orchard twenty-four different varieties of peaches that will fruit this year for the first time if the weather allows. I am also trying a number of different varieties of pears, grapes, etc., in order to find what is best adapted to our wants.

Bergen County.

OFFICERS FOR 1904.

<i>President</i> , SAM'L R. DEMAREST, JR.,	Hackensack.
<i>Vice-President</i> , GEORGE R. BAYLISS,	North Arlington.
<i>Secretary</i> , HARRY I. ANGELL,	Etna.
<i>Treasurer</i> , ABRAM C. HOLDRUM,	Westwood.

BOARD OF DIRECTORS.

MARTIN J. MYERS,	Woodcliff.
JOHN CURTISS,	Harrington Park.
MALCOLM H. ANGELL,	Etna.
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JOHN F. BOMM,	Westwood.
WM. BANDENBURG, JR.,	North Arlington.
TEUMS A. HARING,	Hackensack.
JOHN BEAVER,	North Arlington.

DELEGATES TO STATE BOARD.

SAM'L R. DEMAREST, two years,	Hackensack.
ABRAM C. HOLDRUM, one year,	Westwood.

REPORT.

BY THE SECRETARY.

The Board held four meetings during the past year.

The first was in connection with a Farmers' Institute at Hackensack, February 10th. The second was held on May 6th, 1903. The most enjoyable meeting of the year was held on August 12th, on the farm of H. W. Collingwood, at Woodcliff, in the north-eastern part of the county. Mr. Collingwood has numerous experiments under way at his place. Among the most promising crops are apples, peaches and onions. He also devotes consid-

erable attention to raising young pigs. When the visitors had completed their inspection of the farm, refreshments were served at Mr. Collingwood's house to the members present.

November 16th a Farmers' Institute was held in Hackensack, when a number of questions of interest were discussed.

This has been a prosperous year for our County Board, as the meetings have grown in interest and attendance. There are now four Granges in Bergen county, three of which were organized during the past year.

The weather conditions have been very unfavorable, and poor crops are reported from all sections.

CROP REPORT.

Timothy hay was fairly good, but much of the clover was poor. Peaches and most small fruits were nearly a total failure. Potatoes very poor.

Sweet corn less than one-third of a crop.

Cabbages were good in some sections.

Squashes, pumpkins, citrons and melons were all very poor.

Apples have yielded differently in different sections, but the average is below that of the year previous. Considerable road building has been done during the past year in this county. Free rural delivery has been extended by several new routes, and is appreciated by the people here.

Burlington County.

OFFICERS FOR 1904.

President, EDMUND BRADDOCK,Medford.
Vice-President, HENRY D. CULIN,Hainesport.
Secretary and Treasurer, HENRY I. BUDD,Mount Holly.

DIRECTORS.

J. HARVEY DARNELL, Mount Laurel Farmers' Club,P. O., Masonville.
T. SHERMAN BORDEN, Cooperstown Farmers' Club,P. O., Beverly.
CHARLES I. HOLLINSHEAD, Medford Grange,P. O., Medford.
ROBERT TAYLOR, Columbus Grange,P. O., Columbus.
GEORGE W. LUNDY, Pemberton Grange,P. O., Birmingham.
ALBERT HAINES, Moorestown Grange,P. O., Masonville.
HARRY WRIGHT, Rancocas Grange,P. O., Burlington.

DIRECTOR-AT-LARGE.

AARON W. ENGLE,Medford.

DELEGATE TO STATE BOARD OF AGRICULTURE.

ISRAEL KIRBY, two years,Columbus.

REPORT.

BY THE SECRETARY.

The annual meeting was held at Mount Holly, December 12th. The attendance was large, and many younger men from the agricultural sections of the county were present.

The subjects discussed included: Cultivation of Tomatoes, Lima Beans, Spraying for Fruit Diseases, Dairying and Sale of Milk, The Silo, Effects of Lime, Salt and Sulphur Wash on Fruit Trees and the Help Question, by leading farmers of Burlington county.

The adverse weather conditions of 1903 are fully set forth in the report of the Secretary of the State Board; they apply to Burlington county perfectly, and are, therefore, not repeated here. Suffice it to say the Burlington county farmers have had one of the most unprofitable years in their experience.

GRAIN, GRASS AND MILK.

Wheat, a very poor crop. The early dry weather checked its growth and diminished its yield fully one-half; prices were better than last year. The weevil materially damaged it.

Rye, the poorest crop ever grown; straw light; yield of grain so slight it scarcely paid for the threshing.

Grass for hay was well set and very promising at the start, but on account of dry, cool weather in April, May and early June, the growth was so retarded on many fields it scarcely paid for the cutting. Excessive rains later on in many places caused a larger yield of second crop than from the first crop, but this was much damaged in the gathering by the frequent rains.

Oats not much grown; a moderate crop.

Corn was almost a failure; extra early planting made good growth. Through the usual planting season the ground was so dry and cool the seed could not germinate. Thousands of acres had to be replanted, and this made slow progress on account of continuous cool, wet weather, which also prevented the ears from properly filling out. After the corn had nearly reached maturity, a heavy wind storm, on the 16th of September, did immense damage. The stalks were shredded and most of the fodder blew away. There is scarcely 50 per cent. of a crop. Excessive moisture has stimulated the growth of pasture the whole season.

Growing Winter Grain is exceedingly backward; sowed late; on account of the scarcity of help acreage less than usual.

There seems to be a tendency to sow grass instead of grain after potatoes and other early crops. Scarlet clover largely sown in the corn has made a vigorous growth, and will furnish to the soil an immense amount of food for future crops.

Milk has been in reasonable supply the whole season and sold for good prices.

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FRUITS, MARKET GARDEN CROPS, ETC.

Apples upon trees that did not bear last year yielded well, but the average has been scarcely half a crop. Prices were good until the heavy windstorms blew most of them from the trees; the bruised ones sold at very low prices.

Keiffer Pear leaves were badly affected with a black mould, one of the soot fungi. Back of it is a leaf spot, a true parasite, that has weakened the tissue, causing the trees to be almost defoliated while fruiting. Early frost destroyed the blossoms so there was scarcely one-fourth of a crop, and heavy windstorms dropped the most of this, but, being scarce, they have brought good prices. Few of other varieties are raised. The San Jose scale has nearly obliterated our peach orchards, but the few baskets that found a market realized large prices.

Grapes were a good crop, the fruit excellent.

Cranberries were the heaviest crop ever grown, for which better prices are being realized than have been known for years. To give some idea of the yield in this county, one grower reports 35,000 bushels, another 28,000, two growers 27,000 each, another 15,000, and another 10,000 bushels, besides numerous smaller growers 3,000 to 9,000 each. Burlington county alone has 250,000 bushels, 125,000 of which is in Pemberton township; price realized, \$6 per barrel, which nets the grower over \$1 per bushel; total for the State about 500,000 bushels. The growers above enumerated have each realized this year from their bogs more money than the average farmer can accumulate in a lifetime.

Cherries, Currants, Plums and Strawberries were all reduced in yield by the prevailing adverse weather conditions.

Raspberries and Blackberries were good crops, although damaged by the dry weather.

Tomatoes—Early tomatoes were a fair crop and sold for large prices. Late tomatoes were a moderate crop, and were in great demand at the canneries at \$8 per ton.

Citron and Watermelons, a very poor crop.

Pickles a failure, vines blasted.

Asparagus was a fair crop; sold for large prices; rust still prevails.

Cabbage was a large crop and brought good prices, about four cents a head.

Boiling Corn was a very poor crop. Prices high.

Sweet Potatoes gave the poorest yield for years, owing to cool, wet weather. Most of the tubers were small and only fit for the hogs.

White Potatoes were a good crop. Some large yields were recorded, but the rot destroyed one-third of the crop.

Peas were a poor crop.

Lima Beans promised well, but mostly rotted in the pods.

PORK, SHEEP, POULTRY, ETC.

Pork has not been so healthy in its growth this year, but sells for a reasonable profit.

Few sheep have been fattened this year, as they do not thrive well in wet seasons.

The price of poultry has been high the whole season. There has been considerable loss from roup and other diseases, owing to the wet weather.

Eggs have been in great demand, selling the whole season for remunerative prices.

Squab production is on the increase, which indicates profit.

Broiler ducks, on account of the cool, wet weather, have not been as healthy an industry as in previous years.

Diseases.—Tuberculosis among cattle, cholera among hogs, roup among chickens and spinal meningitis among horses have destroyed many animals.

FARM HELP.

The extreme scarcity of help this year has been a great drawback to the farming industry. Thousands of acres of land have not been properly cultivated and properly cared for on account of the inability to obtain help. Foreign immigration has been

very great and constantly increasing, yet few of them can be persuaded to work upon the farms. Native laborers are constantly leaving to seek more remunerative employment in the factories and cities. If it were not for the Italians our berries and vegetables could not be gathered, and, in many instances, could not be raised. It is becoming a national question whether it will not be an absolute necessity to throw down the Chinese wall of exclusion, at least enough of it to allow the importation of farm laborers. It seems that in no other way will we be able to obtain enough help to profitably work our farms.

The "Widow" says:

"Our ignorance of the Chinese is balanced only by our injustice to them. We ask for the open door for ourselves in China, and we add a Chinese Exclusion Act to our country's bans that shuts our door with a slam. We ask China as a nation to make an exhibit at the World's Fair, at St. Louis. China complies. Large sums are raised. Prince, suit and workmen come as commissioners and workmen to erect Chinese buildings. They are held up on the coast. After months of delay a special dispensation is obtained providing that all Chinese coming to the Fair must be photographed and give a bond that they will leave the country immediately after the Exposition. They must be measured like the veriest criminal and subjected to other indignities."

Bishop Fowler eloquently describes the Chinese character as follows:

"He crosses all seas, burrows into all continents. He surpasses the Saxon in ability to toil in all climates. Silent, gentle, submissive, industrious, economical, temperate, all-enduring, he thrives everywhere. He does not ask for a fair chance. He asks only for a chance, so does not try to crowd anybody. Once landed, he abides. He is not a politician. Never breeds or joins strikes or revolutions abroad. All industries attract him. He never boycotts any trade. Not being ambitious except for more cash, all occupations that pay him are equally satisfactory to him. All countries are his; he is the supreme colonizer, is at home in all lands. Banish the venom of local and political prejudices. Anything the American can do the Chinaman can do, and he does not, like the American, consider certain occupations menial; therefore, why not give our farmers a chance to employ labor that will enable them to profitably cultivate their farms?

Surely the development of our latent wealth will add to the comfort and prosperity of every individual unit of our population."

The much higher prices offered by the farmers this year for labor was not a sufficient attraction to induce the laborers of our country to return to the farms.

With stone roads, trolley lines, telephones, water and gas mains penetrating our rural communities, country life is rapidly becoming more desirable than residence in congested city districts.

Farm products are bringing liberal prices. If plenty of laborers could be obtained our farms, instead of begging for purchasers, would sell for from twenty-five to fifty dollars more per acre than they are bringing to-day, and there would be but few branches of business more pleasant and profitable.

CLIMATIC HISTORY OF BURLINGTON COUNTY, N. J., IN RELATION
TO AGRICULTURE, FOR THE YEAR 1903. BY THOMAS J. BEANS.

	TEMPERATURE.			Rain and Melted Snow. In.	Snow. In.	No. of days on which 1.01 in. or more rain fell.	No. of clear days.	No. of partly cloudy days.	No. of cloudy days.
	Max. Deg.	Min. Deg.	Mean Deg.						
January,	53	9	31.8	3.69	5.7	14	8	10	13
February,	68	.....	34.6	4.71	6.1	11	10	6	12
March,	76	24	48.8	5.28	.....	11	9	4	18
April,	90	28	51.6	5.33	.....	9	13	1	16
May,	93	31	64.2	0.44	.....	5	14	8	9
June,	85	45	65	5.65	.....	12	3	9	18
July,	94	50	73.4	5.44	.....	13	16	9	6
August,	92	49	69.2	5.49	.....	18	7	6	18
September,	88	36	65.7	4.42	.....	9	12	9	9
October,	80	31	57	8.79	.....	11	8	11	12
November,	73	14	41.4	1.18	.....	9	15	6	9
December,	54	9	30.1	4.48	7.4	13	10	12	9
Year,	94	.....	52.73	54.90	19.2	135	125	91	149

The latest killing frost in spring, May 2d (31°); the earliest in autumn, October 27th (31°), making 177 days for out-of-door growth of tender vegetation. Several successive openings of strawberry blossoms were killed by frosts.

In early spring the water-level was higher than for many years in cellars, wells, springs and surface depressions.

From May 4th to June 7th a very harmful drought destroyed mainly the strawberry crop, compelled watering of plants at setting out, many dying in spite of such care, injuring the very early-planted white potato crop, and making the first crop of hay a very short one. The planted corn started badly. At June 7th rains set in, and the season thenceforward was continuously wet.

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The white potato crop (save the very early-planted) was a good one, and though many rotted, the residue was of exceptionally fine table quality and form.

Burlington county has seldom been favored with such a fine second crop of hay, timothy attaining full-headed growth. The frequent rains and humid air prevented its being all stored in good condition, and much was spoiled.

Apple trees bloomed profusely, but many were destroyed by a freeze. The remaining blossoms developed into a good crop. A violent wind and rainstorm on September 16th blew off half the crop and leaves, and further injury resulted from a second harmful storm, but enough remained to supply market needs at not high prices.

The above-named storms broke down the stalks and stripped the blades of corn, so that the crop was the poorest during thirty-eight years' residence, with grain shrived and fodder beaten to the ground.

The Keiffer pears made their poorest crop since their advent.

The peach crop was not a good one.

At winter's coming winter grain had a very unpromising look on light land.

Camden County.

OFFICERS FOR 1904.

President, H. H. BELL,Haddonfield.
Vice-President, H. C. MORGAN,Blackwood.
Secretary and Treasurer—D. W. HORNER,Merchantville.

DIRECTORS.

MR. AND MRS. JOHN GARWOOD,Ashland.
MR. AND MRS. TIMOTHY FOX,Blackwood.
MR. AND MRS. EDWARD THURLOW,Chews.
MR. AND MRS. RANDOLPH BARRETT,Blackwood.
MR. AND MRS. FREDERIC SLEETER,Blackwood.
MR. AND MRS. J. F. BREWER,Chews.
MR. AND MRS. R. C. MORGAN,Blackwood.
MR. AND MRS. THEO. HEIDER,Blackwood.
MR. AND MRS. M. C. BROWNING,Merchantville.
MR. CHAS. BARTON,Marlton.

DELEGATES TO STATE BOARD.

C. C. STEVENSON (2 years),Blackwood.
J. F. BREWER (1 year),Chews.

REPORT.

BY THE SECRETARY.

At no time during our experience has there been evinced such manifestations of interest by our farmers, fruit-growers and truckers in this county as has been shown during the past year, especially at the meetings of our County Board and the Granges.

The twentieth annual meeting of the Board was held at Blackwood, November 30th, and a number of interesting questions were discussed by the members.

Questions selected with care, practical and interesting—sometimes knotty—were previously mailed to successful farmers

and advanced thinkers throughout the county, with the request that they be present and answer them in person. The response that this feature elicited from our stockmen, agricultural students, chemists and specialists, proves to us conclusively a ready willingness on the part of those possessed of superior attainments and information to impart to inquiring minds the result of their observation and experience. The excessive dampness of the past season, causing, as it did, great damage to our fruit and melon crops, has awakened among the people a desire—a great desire—to know more of certain fungous diseases and how to control and prevent their ravages, and I would warn plant pathologists to be prepared in the early future for a demand for information upon a line of investigation they may possibly have thought the farming public had not kept pace with. Camden county has a great variety of soils. The peculiarity of these soils is their superior adaptability to some special crops, and they are being studied more and more by their owners. In fact the exacting demand by the markets for superior products necessitates a more intimate knowledge of the farm by its occupant to such an extent that he has become quite a soil-physicist, and I take a pride, justifiable and pardonable, in recording the fact that—not alone in Camden county, either—great numbers of young men are inquiring into scientific and technical facts appertaining to agriculture, thereby demonstrating that not only the “little red school-house,” but the academy and the college are getting in their work, giving us a glimpse of the revelations and possibilities of the near future.

Among the problems that confronted us during the past year might be mentioned the labor question. During the entire season labor was scarce and wages high, not only out-of-doors but in the house also, and mothers wearied with the toils incident to their vocation can hardly be blamed, when “city fellows” carry off their daughters, in expressing a sigh of relief to think their lot is not continued on the farm. The question how to keep the boy on the farm might be solved by finding out how to keep the girl there.

Notwithstanding the fact that some crops have been failures, the year has been fairly successful. Though hardly up to the average of late, a gradual increase in the value of land is noticed.

CAMDEN COUNTY.

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Our institute held at Haddonfield, December 16th, was presided over by Secretary Dye, and the subjects on the program were treated in a masterly manner by practical men—home talent and State talent. Too much credit cannot be given these men, and we want more of them. The hall was well filled, one-fourth of the audience being ladies. Both dinner and supper being provided, the occasion served well as an annual reunion. A sad feature of the occasion was the sudden death of one of the oldest and most respected of our attendants—Amos Ebert. Mr. Ebert had just finished making a few remarks upon sanitation, upon which subject he was an acknowledged authority, when his heart yielded to the effort and he passed away, virtually dying in the harness, engaged in the cause he loved so well.

Cape May County.

OFFICERS FOR 1903-1904.

<i>President</i> , Dr. E. H. PHILLIPS,	Cape May City.
<i>Vice-President</i> , J. B. HOFFMAN,	Cape May Court House.
<i>Secretary</i> , J. W. PINCUS,	Woodbine.
<i>Treasurer</i> , VOLNEY VAN GILDER,	Ocean View.

DIRECTORS.

HARRY LEAMING, Lower Township,	Cold Spring.
HOWARD HOFFMAN, Lower Township,	Cold Spring.
FRANCIS HARRIS, Middle Township,	Rio Grande.
WINFIELD COOMBS, Middle Township,	Goshen.
HON. F. LUDLAM, Dennis Township,	South Dennis.
HON. J. D. LUDLAM, Dennis Township,	South Dennis.
WASHINGTON VAN GILDER, Upper Township,	Petersburg.
H. P. MICKLE, Upper Township,	Petersburg.
J. SPEECH, Cape May Borough,	Eldredge.
FRED. SCHMIDT, Woodbine Borough,	Woodbine.
MICHAEL BROWN, Cold Spring Grange, No. 132,	Cold Spring.
RICHARD LLOYD, Dias Creek Grange,	Dias Creek.

DELEGATES TO STATE BOARD OF AGRICULTURE.

J. W. PINCUS (two years),	Woodbine.
Dr. E. H. PHILLIPS (one year),	Cape May City.

REPORT.

BY THE SECRETARY.

The Board has held two meetings during the past year, one at Woodbine and one at South Seaville. The meeting at Woodbine, February 13th, had the largest attendance in the history of this organization. The capacious hall of the Agricultural School Building was filled to overflowing. This meeting was held in

co-operation with the State Farmers' Institute. The program consisted of a number of subjects of interest to the farmers of the county, and was enlivened by music furnished by the Agricultural School Band.

The farmers were given an opportunity to visit the dairy, poultry, greenhouses and other departments of the Agricultural School.

The meeting of the Board at South Seaville, on October 29th, was not so well attended. A circular letter from the Executive Committee of the State Board of Agriculture was read, and the President and Secretary were authorized to make the necessary expenses to attract a large attendance of farmers to the next meeting, which would be held at Woodbine in December. The report of farm crops was thoroughly discussed. Mr. George May Powell spoke on "Forest and Forest Fires." Mr. R. M. Washburn, of the Agricultural School, spoke on "Rearing and Feeding of Swine," and Mr. F. Schmidt on "Fruit-Growing."

GENERAL STANDING OF AGRICULTURE.

The crops of Cape May county, in common with others throughout the State, were greatly reduced by the extremes of wet and dry weather. The strawberry crop was about 60 per cent., but prices were fair. Round potatoes did quite well, particularly those planted early. All vegetables, sweet potatoes and corn yielded very poorly.

Tomatoes failed to ripen well, owing to the unfavorable temperature and rainfall in the latter part of the summer. Our canning factories report as follows:

South Dennis, 170 acres of tomatoes contracted and 10,000 cases of cans packed, a very poor yield.

Cape May factory, 140 acres, 25 of which were entirely drowned out; about 515 tons delivered at the factory.

Rio Grande factory had from 280 acres 16,000 cases of cans.

A new factory was opened this season at Tuckahoe, and it packed 200,000 three-pound cans, and had 200 acres contracted for. The price paid at all factories was \$8 per ton.

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Cabbage, melons and cucumbers yielded very poorly, and the crop was of poor quality.

The severe storm on September 17th laid the corn down flat, tore the leaves to shreds, stopped further development and reduced the crop to 50 per cent. and several silos were not filled to their full capacity.

Crimson clover yielded fairly well, but good hay is a scarce article in the county. Grain crops poor.

Peas and oats, cow peas, and other forage crops, particularly those planted later in the season produced good crops.

The severe storm mentioned damaged many fruit trees. Many of them were broken and nearly all the fruit was blown off.

Peach buds were injured by frost in April, so that practically there were no peaches in the county. One man, having ten acres of peach trees in fine condition, picked eight baskets of peaches. Our summer resorts had to import most of their dairy products, poultry and eggs, and a great deal of fruit from the neighboring counties and city markets.

There is a great opportunity in this county to develop the agricultural possibilities producing such crops as the local market demands in summer and the city markets in winter.

Cumberland County.

OFFICERS FOR 1904.

<i>President</i> , ANDREW MILLER,	Bridgeton.
<i>Vice-President</i> , ARTHUR SEABROOK,	Bridgeton.
<i>Secretary and Treasurer</i> , CHARLES DUNSAFE,	Cedarville.

EXECUTIVE COMMITTEE.

W. S. BONHAM,	Hopewell.
FRANK GOODWIN,	Greenwich.
MORGAN SMALLEY,	Stone Creek.
D. H. BURGE,	Landis.
JEREMIAH CHAMBERS,	Maurice River.
CHAS. DUNSAFE,	Lawrence.
JOHN T. WHITAKER,	Fairfield.
ARTHUR SEABROOK,	Deerfield.
BUTLER PAGE,	Downe.
J. S. TURNER,	Commercial.

DELEGATES TO STATE BOARD.

A. H. WILSON,	One year.
W. S. BONHAM,	Two years.

REPORT.

BY THE SECRETARY.

The Board has held one meeting this year, at which the above officers were elected. Having held former meetings in Bridgeton, the officers thought best to hold the annual meeting in Vineland. We had a very interesting and instructive meeting.

A very interesting and instructive address was made on lima bean culture and poultry and egg production. The speaker, Mr. Schinter, being a successful man in those branches, was able to give us some good suggestions.

The Secretary read a few suggestions on tomato culture.

The Board passed a resolution favoring the passage of such laws as will be a benefit to the State Agricultural College and the farmers throughout the State.

REPORT OF CROPS.

Corn crop was about as last year.

Wheat only fair.

Oats poor, below the average.

Hay—No crop at all first cutting, but second crop was good, thus helping the farmers out very nicely..

White Potatoes good both early and late, but not quite as good as last year.

Sweet Potatoes, owing to the extreme wet season, were almost a failure; while some have had fairly good crops, the majority have had nothing but cullings. The failure of this crop means a great deal to this county, especially in the lower section.

Apples, a light crop.

Pears few, prices high.

Strawberries, only fair crop, and prices ruled very low.

Citron Melon almost a total failure, owing to the extreme wet weather.

Cabbage crop good, both early and late.

Tomatoes—Same old cry as has been for years—no crop—blossoms all drop off, large vines no fruit. The average yield has not been over three tons to the acre, but early tomatoes were a good crop and paid fairly well.

Our farmers on an average have had a very poor year. Very seldom have they had so many crops fail. Grass grew in abundance, and it was almost impossible to keep it down, owing to excessive rains. Farming was expensive, as crops were poor.

The institutes held in county are well attended, and the farmers are learning a great deal and getting some practical information from the able helpers of the State officers.

Essex County.

OFFICERS FOR 1904.

<i>President</i> , CYRUS B. CRANE,	Caldwell.
<i>Vice-President</i> , ISAAC S. CRANE,	Chatham.
<i>Secretary</i> , J. H. M. COOK,	Caldwell.
<i>Treasurer</i> , GEO. E. DECAMP,	Roseland.

REPORT.

BY THE SECRETARY.

This Board has held four meetings the past year. All were interesting and profitable.

The first meeting was January 10th. The subject of fruit culture was made the special order. Our delegates to the State Horticultural Society gave comprehensive reports, and the many items of interest which they brought from this annual session of fruit-growers furnished subject-matter for animated discussion.

The next meeting was held February 11th, when we were favored with an address by Dr. Voorhees, upon soils and their constituent elements. Some points prominently mentioned were: Soils are formed by the breaking up of the earth crust of rock. The clay sand and other kinds of earth all come from the disintegration of rock. Soils are full of living organism, and it must be manipulated so as to promote activity in order to produce growth. Organisms of soils cannot be destroyed by cold, but may be killed by extreme heat. If the soil is allowed to lay bare during very hot spells, it kills the living organism, which results in loss to the soil, and it is therefore less productive. All foods for plants must be in a soluble condition to be utilized by the plant, and when the nitrate in the soil once becomes soluble, it

never goes back again. If there are no plant-roots there to take and utilize it, it goes away in the air and is a loss to the soil. Hence, it is always an advantage to keep a crop growing rather than allow the soil to remain bare.

The third meeting was March 5th, when we listened to an address upon the sanitary condition of stables for dairy cows, by S. B. Ketchum.

The fourth meeting was December 10th. It being the annual meeting, the time was occupied with regular business and discussion of topics of local importance.

The institute held at Verona was usually well attended and appreciated by all. The subjects talked upon and discussed were: The best foods for dairy cows, the cultivation of alfalfa clover, fruit culture, and the care of poultry and profit in egg production.

GENERAL CROP CONDITIONS.

The past season has been the most disastrous, in a financial way, in the memory of Essex county farmers. Causes beyond the control of man seemed to conspire to bring failure upon our efforts to grow crops. The spring opened with a severe drought, which baked the ground so hard that plowing in many cases was an impossibility, and seeds that were planted failed to germinate, which necessitated replanting. When the weather changed and rain came, it continued to rain incessantly, with short intervals of clear weather, until fall, giving us a very cold, wet summer. Garden crops failed to mature, often moulding on the vines.

The grass crops grew well after the rains came, but very much hay was spoiled in curing. All of the low ground meadows failed as they were under water the entire summer. The floods did much damage other than the loss of crops, by destroying roads and bridges.

Apples were the best of the fruit crops and sold at good prices.

Our milk producers find it impossible to maintain the regular supply of milk at a profit, as the empty silos and half-filled barns necessitate the purchase of feeds at a high price, and many are reducing the number of cows.

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The demand for improved roads continues to increase, and our county authorities are building stone roads as fast as the appropriations become available. Both city and country people appreciate good roads.

The railroads and trolley company are extending their lines through the county, making our farms more desirable for suburban homes than for farming purposes.

EXTRACT OF ANNUAL ADDRESS OF PRESIDENT C. B. CRANE.

After recounting meetings held and addresses given, the main points of which are covered in the foregoing report by the Secretary, Mr. Crane said: The farmers' experience has not been encouraging. An early frost destroyed most of our peach crop and much of the pear crop also, while apples seemed to survive it and grew in abundance. Cherries and plums were about as scarce as peaches. Meanwhile the ground, first baked by a lengthy drought and then soaked for most of the season later, made planting and cultivating difficult, and resulted in many cases in almost an entire failure of the crops.

Corn was generally very poor, as two of its essentials, sunshine and heat, were often lacking.

While potatoes grew in abundance, yet on heavy soils there were very few of value.

Upland hay was one of our best crops, but the low meadows were an entire loss, as the Passaic repeatedly spread over its valley.

These conditions have given farmers an excellent chance to study economy as well as agriculture, both of which are important.

This season has again demonstrated the wisdom of thorough drainage, as the crops of those who have their land in such condition will testify.

But we should not be discouraged, for with the best of markets and good roads to reach them, we will hope that this year's experience will not soon be repeated, and with due diligence and a wise use of all the advantages of information that our State

is now supplying, farmers may soon be again on the road to prosperity.

In December of last year we were favored with a farmers' institute, conducted by Secretary Dye, which was very enjoyable and profitable. The subjects, "Good Seed and Good Management," "The Dairy Cow," "The Profitable Chicken" and "Horticulture." The attendance was fair for Essex county. Entertainment was provided by the ladies of Verona.

During the past year we have met with the loss of one of our most faithful members, Mr. W. W. De Camp. He took an active part in the discussions of the Board and in public affairs, and in his death the whole community has lost a good citizen of large acquaintance and influence.

The Executive Committee of the State Board of Agriculture has recently sent a circular to the County Boards urging more earnest work among them in order that they may help the farmers to become more progressive and farming more profitable, and also that they may be more interested in, and contribute to, the success of the State Board meetings by attending them, and thus showing that they appreciate the efforts made by the State, through the State and County Boards, for the farmers' benefit.

And this brings us to a question of first importance in our Board, How may we make our meetings more profitable and increase the interest and attendance? This is often a difficult question, but we can at least try to solve it.

We might occasionally drop the questions relating to farm crops and take up broader ones, which affect not only the farm, but the State, in the care of its citizens, such as education, taxation, influence of trusts, the wisdom or justice of various laws and their effect upon the farmer. This plan of work would involve some close study of these less familiar subjects, and thus be a benefit to all who would engage in it. It would cause farmers to be better informed regarding these subjects, better able to judge of what laws are needed, and thus make more intelligent and capable citizens. The business of farming should become more and more one of the learned professions, as the farmer studies the results obtained by our Experiment Stations and Agri-

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cultural Colleges and applies them to his life on the farm and becomes a graduate from the school of experience. He should honor his calling by making the most of his advantages and getting profit from his farm, and in being qualified to be of service to others.

But how can this plan of discussion be made to work in our meetings? A program should be made for each meeting and speakers appointed to lead the discussion, and if the members are willing to give sufficient time to study the subject, there should be both interest and profit to all who attend. If we wish to create an interest in any subject, let us first become interested in it ourselves, and then it will spread to others by our enthusiasm.

More attention should be given toward making the farmers' home life and surroundings inviting and attractive, and thus help the boys to feel that the farm, and not the city, is the best place to enjoy a happy life.

Gloucester County.

OFFICERS FOR 1904.

<i>President</i> , JOSEPH T. CARTER,	Mickelton.
<i>Vice-President</i> , ELMER E. CLEMENT,	Thorofare.
<i>Secretary</i> , BENJAMIN HERITAGE,	Mickleton.
<i>Treasurer</i> , WM. H. BORDEN, R. F. D. No. 1,	Swedesboro.

EXECUTIVE COMMITTEE.

THEODORE BROWN,	Swedesboro.
LEWIS MORGAN,	Harrisonville.
MARY WOLFERTH, R. F. D.,	Clarksboro.
EDITH K. WHITE, R. F. D.,	Sewell.
JAMES CARTER,	Thorofare.

DELEGATES TO STATE BOARD.

JOHN TONKIN, two years,	Glassboro.
FRANK KIRBY, one year,	Harrisonville.

REPORT.

BY THE SECRETARY.

The Board has held four meetings during the year, with an increased attendance and a lively interest taken. One meeting was held at Mickleton, where we had the largest attendance of the year. Generally have a good display of products in their season.

The annual institute held at Swedesboro, November 18th and 19th, under State supervision, had a large attendance. Two or three new topics, as "Chemistry for Everybody," "School Horticulture and Nature Study," were introduced. But some of our

members, not being educated up on these questions sufficiently to take part in the discussion, were disposed to find fault; preferring old subjects with which they were better acquainted.

The annual Grande picnic was larger than ever and more attractive, produce being finer, machinery exhibit nearly double, live stock, musical instruments and ladies' work more than usual.

The past season has been favorable to the growth of early potatoes and cabbage, while for other truck it has been almost a failure.

Hay was very poor crop, some pieces hardly worth mowing. Wheat poor crop; less sown every year. White potatoes above the average in crop and price. Sweets very poor crop. Vine truck a failure. Fruit crop small and poor. Pork not as high in October this year as last year; price in this county, \$8 per hundredweight. But at present, December 25th, \$6. Poultry has sold well.

Hunterdon County.

OFFICERS FOR 1904.

<i>President</i> , E. M. HEATH,	Locktown.
<i>Vice-President</i> , JOHN T. COX,	Readington.
<i>Secretary</i> , WM. W. CASE,	Baptisttown.
<i>Treasurer</i> , F. J. TOMLINSON,	Pittstown.

DIRECTORS.

H. F. BODINE, Hunterdon County Pomona Grange.
JOHN Q. HOLCOMBE, Ringoes Grange.
WM. B. HACKENBURY, Locktown Grange.
JOSEPH HAGERMAN, Sergeantsville Grange.
ELLIS B. HUFFMAN, Kingwood Grange.
WM. SCOTT, Oak Grove Grange.
M. W. ANGELL, Spring Mills Grange.
JOSIAH PRALL, Grand View Grange.
JAMES LANE, Riverside Grange.
URIAH SUTTON, New Jersey Fruit Exchange.
A. B. ALLEN, Hunterdon County Peach Exchange.

DELEGATES TO STATE BOARD.

JAMES LANE (two years),	Readington.
E. W. HEATH (one year),	Locktown.

COMMITTEE ON PEACH STATISTICS AND REPORTER TO STATE BOARD—Wm. W. Case.

Other organizations in county :

NEW JERSEY FRUIT EXCHANGE.

<i>President</i> , JOHN T. COX,	Readington.
<i>Secretary</i> , M. STOCKTON,	Pattensburg.

HUNTERDON COUNTY PEACH EXCHANGE.

<i>President</i> , A. B. ALLEN,	Flemington
<i>Secretary</i> , P. M. MECHLING,	Pittstown.

REPORT.

BY THE SECRETARY.

During the year past two regular meetings of the Board have been held—in August and November. The August meeting, held at Baptisttown, was largely attended by farmers from different parts of the county, who came to learn of better things. After a talk by Secretary Dye, Prof. E. B. Voorhees spoke on "Farm Fertility; The Use and Abuse of Commercial Fertilizers." Hunterdon county farmers are fairly wide-awake on the fertilizer question, and listened very attentively to the address.

The annual meeting was held at Flemington, and was mainly a business meeting. Canvassing the crops for report and planning a campaign against the San Jose scale received a large share of attention.

Farm values are still on the decrease, and prices on real estate are lower than for several years past. As to the cause of this decline some claim it to be want of better roads, school facilities, etc. The change from our former bulky freeholder system to a board of three members may better our road and bridge system; that may possibly benefit our real estate values.

The season just closed has been one of the most peculiar on record, and has given nearly a general crop failure. (The various weather conditions of the season, as described by Secretary Case for Hunterdon, are set forth in the report of the Secretary of the State Board, which see.)

Crop yields for county: Hay, $1\frac{1}{4}$ tons per acre; wheat, 14 bushels; rye, 13 bushels; oats, 26 bushels, and potatoes, 87 bushels per acre.

The tomato pack was very small, only 53,000 cans being packed in the county.

SAN JOSE SCALE.

The justly celebrated orchards of Hunterdon county face utter destruction from the San Jose scale. There is not a square mile

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in the county that is not more or less infested at the present time. Thousands of peach, pear and other orchard trees, also forest trees, are being attacked and destroyed.

Peach trees are especially susceptible, and no orchards reach beyond the fifth year without spraying.

Osage orange hedges are generally infested, and serve to propagate the pest. From these hedges the birds carry the scales to orchard trees, and thus the infection is extended to non-infested trees (*cut the hedges*).

So far the lime, salt and sulphur spray is the only thing found to check the ravages of the pest.

Our only hope now would seem to depend upon the work of the lady-bug, which the United States Government is breeding for the eradication of the scale. State aid is also badly needed.

The tent caterpillar was absent the past season, and we trust its enemies will keep it subdued for years to come.

FRUIT.

Apples and blackberries excepted, there was only fruit enough produced the past season to supply the robins and other fruit-loving birds.

The robin's nature seems to be undergoing a change. It has been claimed he is an insect destroyer, but during the past season he became a pest in the cherry trees and berry patches. If during another season he shows the same appetite, I for one will advocate the withdrawal of the laws of protection. New Jersey and other Northern States breed and protect him, while the blacks of the South use him during the winter as food. All bird-protection laws to-day are out of harmony and work at cross-purposes, as one State protects birds that are outlawed by neighboring States, and vice versa.

THE WILD PIGEON.

Notwithstanding the report published as a fact for several years past, that the wild pigeon (*Ectopistes migratoris*) is extinct, a flock of sixteen of these spent several days in August on

my hay and pasture fields. Thirty years ago they were so numerous as to be, in some seasons, a nuisance in fields of freshly sown grain. This flock is the only one reported from this State within fifteen years.

DAIRYING.

Dairying is on the increase, and at least one new creamery has been erected at Readington.

Many farmers near railroads sell their milk direct to milk companies for city consumption, in general receiving rather more than at butter creameries, but at loss off of skim milk—no small factor in farm economy.

Creameries in general report gains in quantity received and also pay somewhat better prices than one year ago.

Cherryville Creamery gives substantial gains, having received 1,213,685 pounds of milk, against 1,105,563 pounds last year, being a gain of 10 per cent.; Oak Grove Creamery reports 910,830 pounds, against 883,015 pounds last year, also a nice gain. Both creameries are owned by Mr. C. R. Peterman, Cherryville, N. J., and both paid an average of $27\frac{1}{4}$ cents per pound for butter fat, against \$1.07 per cwt. of milk last year.

The report from Locktown Creamery is given in full by George W. Hockenbury, Secretary and Superintendent.

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REPORT OF THE WORKING OF THE LOCKTOWN CREAMERY FOR THE YEAR ENDING
OCTOBER 31ST, 1903.

	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 per cwt. for milk.
November, ...	128,286	6,607	\$1,920 72	\$68 85	4.34	\$0 32	\$1 39
December,	118,120	6,227	1,985 67	61 90	4.44	34	1 51
January,	118,704	6,259	1,720 75	59 40	4.31	30	1 29
February,	109,137	5,705	1,657 09	56 00	4.32	32	1 38
March,	117,030	5,742	1,850 56	59 82	4.10	35	1 44
April,	110,999	5,404	1,591 27	60 00	4.17	32	1 33
May,	158,773	7,699	1,816 55	79 80	4.20	25	1 05
June,	179,837	8,843	2,027 20	93 20	4.15	25	1 04
July,	166,121	8,104	1,820 38	88 55	4.09	25	1 02
August,	169,173	8,111	1,719 08	87 65	3.98	23	92
September, ...	178,587	8,582	1,834 90	91 65	4.02	23	92
October,	179,311	8,448	1,865 48	93 04	4.02	24	96
Total,	1,734,078	85,732	\$21,809 65	\$899 86	4.18—	\$0 28½	\$1 18¾

Everittstown reports milk received, 1,203,597 pounds; average price for butter fat, 26 cents per pound. Received in 1902, 1,220,915 pounds; paid per pound for butter fat, 25.5 cents.

POULTRY.

During November all hens went on strike, and owners of flocks numbering hundreds failed in many instances to get any eggs whatever, and the same conditions prevailed up to December 15th. The price in local markets December 1st reached 40 cents per dozen. Such a failure in egg production is not usual.

Mr. S. O. Heath, of Kingwood, from an average of 450 hens, sold for year ending August 31st, 1903, eggs per month as follows:

STATE BOARD OF AGRICULTURE.

1902.				1903.			
September,	462 doz.	@	\$96 90	March,	240 doz.	@	\$41 40
October,	143	" "	34 86	April,	864	" "	116 32
November,	49	" "	13 72	May,	582	" "	92 10
December,	30	" "	9 00	June,	570	" "	100 20
1903.				July,	482½	" "	86 96
January,	30	" "	9 00	August,	291	" "	58 20
February,	60	" "	18 00				
Total, 3,803½ doz. sold; amount, \$676.66.							

The above report makes no item of the eggs set to raise several hundred chickens and for domestic use, but net number of eggs sold only.

The report of Mr. James E. Farmer, of Flemington, of his flock of thirty pure-bred white Wyandotte hens for the year ending August 31st, 1903, is appended as a sequel to his report of last year, and is of value to poultrymen, being an exact business statement.

<i>Dr.</i>		<i>Cr.</i>	
Feed bought,	\$52 27	Eggs retailed,	\$59 00
Stock bought,	5 40	Eggs sold for hatching,	32 71
Materials for houses and repairs,	2 16	Poultry sold,	41 00
Eggs set,	2 09	Poultry killed,	8 50
Thirty hens,	15 00	Droppings sold,	4 35
		Inventory, 48 head,	24 00
	<hr/>		<hr/>
	\$76 92		\$169 56

Leaving net balance \$92.64.

Eggs laid, 4,034.

Average per hen, 134½.

Chicks raised, 85.

Turkeys were never scarcer, and sold for Thanksgiving at 20 to 23 cents per pound, live weight.

The raising of turkeys at such prices should become one of the most valuable adjuncts of general farming, but the birds seem rapidly degenerating in both size and vitality, and large flocks are no longer seen around the farm buildings, as formerly. Fifteen years ago flocks of 100 to 150 birds were quite common, and smaller flocks at nearly all farms; to-day a flock of 25 is a rarity. Possibly our growers have sacrificed vitality to size. Careful selection of breeding stock and a blending of wild blood might infuse new vigor.

Mercer County.

OFFICERS FOR 1904.

<i>President</i> , D. C. McGALLIARD,	Trenton.
<i>Vice-President</i> , JOHN V. GREEN,	Wilburtha.
<i>Treasurer</i> , I. J. BLACKWELL,	Titusville.
<i>Secretary</i> , FRANKLIN DYE,	Trenton.

DIRECTORS.

J. W. HENDRICKSON, WM. D. HILL, D. C. McGALLIARD, CHARLES BLACK,
ALBERT H. ROGERS, J. F. ALLISON.

DELEGATES TO STATE BOARD.

THEO. CUBBERLY, two years,	Hamilton Square.
J. M. DALRYMPLE, one year,	Hopewell.

REPORT.

BY THE SECRETARY.

There are over 1,500 farms of varying size in Mercer county, average size 78 acres. For those that produce the old, standard crops, concerning which we are furnished reliable information as to yield and price, and comparing them with the same crops for 1902, we find a reduction in value for all of only \$157,015. While there is a large reduction in corn, wheat, rye and oats from last year, hay and white potatoes have brought up the total earnings.

The accompanying table will show the totals for each crop, with the valuations of 1902:

<i>Crop.</i>	<i>Acres.</i>	<i>Bus. per. Acre.</i>	<i>Total Yield.</i>	<i>Average Price.</i>	<i>Total Value.</i>	<i>Totals for 1902.</i>
Corn,	22,000	20	440,000	56c.	\$246,400	\$523,600
Wheat,	12,000	12	144,000	80c.	115,200	200,640
Rye,	4,000	10	40,000	60c.	24,000	38,400
Oats,	10,000	20	200,000	35c.	70,000	156,000
Hay—						
Timothy and mixed,	23,000	<i>Tons.</i> 1½	<i>Tons.</i> 34,500	\$15.00 ton.	517,500	264,000
White potatoes,	1,800	125 bu.	225,000	55c.	123,750	79,200

Were it possible to obtain statistics covering the dairy and market garden products, and poultry and swine sold, a large addition would be made to the total earnings.

No radical changes in the character of the crops grown nor in the methods pursued in their production in Mercer county during the past year have been introduced.

The dairy industry is a leading one, and to maintain it and keep the farm up to a state of productiveness capable of doing the extra work required of it, a different system of farming is quite necessary from that where no commercial dairy is maintained, or else impoverishment, instead of improvement, will follow.

The production of forage crops in abundance for the support of the stock in summer and autumn, instead of depending upon the ruinous pasturing system, and for the winter and spring, at least, a good supply of well-grown, carefully stored silage; with these two and the feeding of the usual concentrated feeding stuffs required, the farm will improve, while the dairy will return its full share of the revenue.

The dairy business should be pushed in Mercer county for all it is worth. All New Jersey farmers in reasonable distance of Trenton should take advantage of this, their *every-day* home market, and not allow Pennsylvania dairymen to carry off their profits across the river, while paying no tax on this side in support of our industries. And not only does Trenton, with its population of about 75,000, furnish a market for milk and other dairy products, but also all market garden crops and fruit that can be grown in this locality, with poultry and eggs. If the farmer will only produce a prime article and guarantee a steady supply, a steady demand will be forthcoming.

MERCER COUNTY.

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The San Jose scale is the standing menace to the production of orchard fruits. This was reinforced during 1903 by weather conditions inimical not only to fruit production, but to several other crops as well. The variations of drought and flood, of extreme heat and premature frost, as set forth in the Secretary's report for the State Board, apply to this county. They have not been so injurious and destructive for years past. But we are thankful that we still live, our farms are still here, and we have enough to carry our families through the coming winter. And we will cherish the hope that another year may be more propitious to the farming business, and through it to all the other industries in this county.

The canning establishments in the county are three.

Hopewell reports: Received from the farmers 80 tons of tomatoes. Number of cans put up, 30,000, an average from 375 to 400 cans per ton. Price paid the farmers, \$8.

The crop has been marketed: Futures, \$1 to \$1.10 per dozen. The yield per acre, $1\frac{1}{2}$ tons, which was very small on account of wet weather and of a season in general not suitable to their growth.

Pennington states, the average yield of tomatoes was very light, only producing about two tons to the acre on an average. We had but sixty acres planted, the very wet weather in June preventing many farmers from setting their plants, and the disastrous rain and wind storms later in the season caused the tomatoes to rot. We packed 40,000 cans.

Titusville gives: Packed 33,250 cans of tomatoes during the season, which was a very light output. The causes were dry weather in June, followed by continuous cold, wet weather during the remainder of the season, which, on our heavier lands, caused a very light set of fruit and blight of plants. The floods of October 10th damaged our plant so that it was impossible to operate it later.

The County Board held its annual meeting March 6th, when the officers named were elected. Addresses were made on "The Production of Swine" and on "Methods of Determining the Productive Value of a Dairy Cow." Both addresses were highly suggestive and helpful to all those who heard them.

STATE BOARD OF AGRICULTURE.

The fall meeting was held at Pennington in connection with the Farmers' Institute, on December 5th. At this meeting a delegate to the State Board was elected for two years, from January 1st, 1904, and two delegates to the meeting of the State Horticultural Society.

Just across the line that separates Mercer and Monmouth counties, at Allentown, is located the Farmers' Co-operative Canning Company. They report a pack for the past year of 60,000 cans and 300 barrels of pulp.

Middlesex County. .

OFFICERS FOR 1904.

President, D. J. PERRINE,New Brunswick.
Vice-President, D. C. MERSHON,Prospect Plains.
Secretary and Treasurer, WM. FITZ RANDOLPH,New Market.

DIRECTORS.

Charles Edwards, A. E. Perrine, William Cox, Howard Butcher, Seward Applegate, A. Pierson, William Oberman, W. H. Giles, Frank Hart, DeHart Voorhees, W. F. Woerner, N. D. Runyon, Walter Green, Lewis D. Walker, Jr., C. S. Boice.

DELEGATES TO THE STATE BOARD.

B. DEWITT GILES, two years,New Market.
R. F. P. VON MINDEN, one year,New Market.

REPORT.

BY THE SECRETARY.

Four meetings of the County Board have been held during the year, the attendance being better than last year.

On November 21st the annual meeting was held, and the officers were elected to serve for the ensuing year.

The statistics for report were prepared, after which "The Best Methods of Securing Farm Help" was discussed. It was generally conceded that so long as large corporations continue to employ so many men in gigantic enterprises as are now going on help will be scarce.

Our county should be one of the best in the State for the business of farming, situated, as it is, in a section where there is a

home market for all kinds of products. Factories are numerous and our population is continually increasing. Our soil is adapted for the growing of nearly every crop raised in our climate. Trolley and steam-car lines traverse us in every direction. Miles of macadam roads are built every year, and rural free delivery has been established for some time. Notwithstanding all these advantages, farming land can be had at reasonable prices, taxes are moderate. Nearly every township has graded school facilities.

Monmouth County.

OFFICERS FOR 1904.

<i>President</i> , DANIEL JONES,	Freehold.
<i>Vice-President</i> , JOHN R. PARKER,	Freehold.
<i>Secretary</i> , D. AUG. VANDERVEER,	Freehold.
<i>Treasurer</i> , JOHN B. CONOVER,	Freehold.

EXECUTIVE COMMITTEE.

JOHN H. DENISE,	Freehold.
WM. H. REID,	Tennent.
H. V. M. DENNIS,	Freehold.

DIRECTORS.

JAMES H. BAIRD,	Marlboro.
JOHN H. DUBOIS,	Freehold.
GEORGE L. DUBOIS,	Tennent.
EDGAR H. SCHANCK,	Holmdel.
E. A. SEXSMITH,	Wall.
H. E. HULSHART,	Farmingdale.
JACOB B. CONOVER,	Baird.
JOHN STATESIR,	Colt's Neck.
C. C. HULSART,	Matawan.

DELEGATES TO STATE BOARD OF AGRICULTURE.

C. C. HULSHART, 1 year,	Matawan.
D. D. DENISE, 2 years,	Freehold.

REPORT.

BY THE SECRETARY.

The first meeting of the year was held in the Court House, Freehold, on February 27th, when our delegates to the State Board of Agriculture presented their reports of those meetings.

Addresses were made on "Asparagus Growing," on the "Uses of Lime" and "Cheaper Method of Milk Production," which were discussed by members of the Board. Number of members present, 100.

The annual meeting was held on November 21st. Officers were elected for the ensuing year. Topics discussed were: "Silos," "Spraying for Fruit Diseases, Leaf Blight and Scale" and "Working of the New Road Law; Should it be Repealed?"

Institute was held at Keyport on November 20th and 21st, under the direction of the State Board. The Monmouth County Fruit Growers' Association meets every two weeks at Keyport during the winter.

CONDITION OF CROPS.

Asparagus yield, 75 per cent.; prices good. Corn yield, 50 per cent.; injured by drought at planting time, excessive rains during the summer and severe wind and heavy rainstorms later, doing great damage to both grain and fodder; price, 60 cents. Wheat, 75 per cent.; price, 80 cents. Rye, 75 per cent.; price, 60 cents. Many farmers sell their rye crop in the sheaf; price for both, without threshing, \$16.50 to \$17 per ton. Hay, 60 per cent.; selling from \$16 to \$20 per ton. Second crop of hay and late pasture a good yield. Potatoes, 100 per cent. of a crop, of which about 20 per cent. rotted in the field; prices were good, and it was a profitable crop. Sweet potatoes, 50 per cent.; price, \$2 per barrel, quality poor, owing to too much rain. Watermelons and citron melons, 25 per cent. Cucumbers and pickles, 10 per cent. Cabbages and tomatoes, 50 per cent.; prices good. The yield of peas and lima beans about 50 per cent.; a large quantity are grown near Freehold for the canning factory.

The growing of lettuce and cucumbers under glass for market is carried on quite extensively at Morganville, in this county.

THE FRUIT INDUSTRY.

The fruit industry in the county for the year past was badly damaged by the extreme conditions of the weather. The loss to

MONMOUTH COUNTY.

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the fruit-growers throughout the county will be very large. For most varieties the yield is much below the average, and the quality not up to the usual standard. There was a very heavy bloom of apples, pears, peaches, plums and cherries. The trees had passed through the winter in good condition and promised a large crop, but the adverse weather conditions that prevailed throughout the State existed in this county as well, and reduced or injured most crops.

The pear crop was very light, from 15 to 20 per cent. Many Bartlett pear orchards have been destroyed by leaf blight, and the Keiffer pear has also suffered severely from the same cause; the fruit is small and rusty. Peaches, plums, pears and early strawberries were ruined by late frosts at blooming time. Raspberries, blackberries, currants and gooseberries, a full crop. Huckleberries on uplands were killed by late frosts and drought, while on low, wet places the crop was good. The yield of cranberries was a full one. There has been a gradual increase throughout the county in the fruit industry, new orchards of apples, pears, peaches and plums having been set the past year, while a few old apple orchards have been taken out. Very little fruit is grown under glass for market. In the marketing and packing of fruit there is little change. Cold storage for apples and pears is increasing. A large quantity of fruit is used for canning, jellies, marmalades, etc. Most of the apples not fit for market are made into cider, vinegar and whiskey. Grapes are grown for market and wine; yield, 100 per cent. A new blackberry to be introduced this year is worthy of notice. It is named the Ward. It was found growing on the Michael Ward farm, in this county. It is a seedling of the Kittatinny, is very prolific and quality best. Orchards are receiving much more attention than formerly. Better methods in tilling, training, pruning, fertilizing, thinning and spraying are required to make it a success. There is nothing particularly new concerning plant diseases or injurious insects, most of which can be controlled by the proper spraying of the trees with the various insecticides. The San Jose scale has done great damage. The best remedies are being sought for its extermination. The leaf blight has been very prevalent the past

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year, mostly on the apple and pear. The best remedy is several sprayings with the Bordeaux mixture during the season.

LIVE STOCK.

There is very little change from last year. Horses are about \$25 per head higher. A little more demand for milk cows for the dairy. Turkeys are scarce and higher. The season was too wet for them.

Morris County.

OFFICERS FOR 1904.

<i>President,</i>	LYMAN J. FISH.
<i>Secretary,</i>	WM. F. ELY.
<i>Treasurer,</i>	WESLEY D. HOPPING.

BOARD OF DIRECTORS.

JOHN S. GOLDBERG, JOHN OLIVER, JOHN J. MITCHELL, EDGAR C. HOPPING, JAMES
COOK, W. B. LINDSLEY, S. E. YOUNG, FRANK P. COOK, W. D. GOBLE,
WILLIAM JAMES, W. H. LITTELL.

DELEGATES TO STATE BOARD.

S. E. YOUNG,	Two years.
W. H. LITTELL,	One year.

At a meeting of the Board the above officers were elected for 1904, and it was resolved that the coming year the Board should hold three meetings, and instructed the Secretary to engage speakers and have discussed whatever would most interest the farmers, the first meeting to be held at Morristown some time in January, at which Professor Smith will give an address on San Jose scale. After it, an opportunity will be given those present to discuss the new primary law and other matters of general interest.

Ocean County.

OFFICERS FOR 1904.

President, C. M. RORER,Cassville.
Vice-President, P. DAVITT,Toms River.
Treasurer, H. R. WILLS,Toms River.
Secretary, CHAS. R. GRAHAM,Red Valley.

DIRECTORS.

ALFRED JENKINS,Cassville.
ENOCH LANNING,Cassville.
A. B. CLUTE,Toms River.
E. APPLGATE,Toms River.
H. R. WOOD,Lanoka.

DELEGATES TO STATE BOARD.

C. M. RORER, two years,Cassville.
C. R. GRAHAM, one year,Red Valley.

REPORT.

BY THE SECRETARY.

The Board of Agriculture, owing to the absence of President and illness of Secretary, has held only two meetings, both at Toms River. At the November meeting the officers were elected.

The past year has not been very encouraging to the farmers in general, owing to the extremes of weather, which interfered with the planting and ripening of crops.

Ocean county has some advantages over some of the counties, as the farmers have more or less land on or near their farms which will produce cranberries, as it has done this year, and this helps out, being a fair crop and sold for good prices.

For the Keiffer pear, which grows best on sandy soil, we should have some system in marketing. Those that are hand-picked off the trees should not be mixed in with the wind-falls, and so put on the market. They will never bring the price or reach the standard of perfect crops in this way.

Ocean county needs a cross-cut, either steam or trolley road, from Lakewood to Trenton, as our facilities of transportation are confined solely to horses and is expensive.

Salem County.

OFFICERS FOR 1904.

<i>President</i> , GEORGE H. KIRBY,	Woodstown.
<i>Vice-President</i> , SAMUEL FLITCRAFT,	Woodstown.
<i>Secretary</i> , GEORGIE A. DUELL,	Woodstown.
<i>Treasurer</i> , JOEL BORTON,	Woodstown.

EXECUTIVE COMMITTEE—Edgar C. Moore, C. French Moore, Benj. F. Straughn, Henry Gardiner, Jessie L. Colson, M. D. Dickinson, with the President, Vice-President, Secretary and Treasurer.

DELEGATES TO STATE BOARD.

GEORGE H. KIRBY, two years,	Woodstown.
EDGAR C. MOORE, one year,	Woodstown.

REPORT.

BY THE SECRETARY.

The Salem Board of Agriculture has held four meetings during the year, with quite a good attendance. The subjects discussed have been of interest to the farm and home. Some of these were a talk upon "Soiling," "Making Bread by the Scientific Bread Machine," a talk upon "Duck-Raising as a Profitable Industry for Farmers," "How, What and When to Plant in the Kitchen Garden," and a paper upon "Necessity of Farm Accounts." In October we heard from W. Sithens, of Mullica Hill, and had a talk on the raising of Belgian hares. These, with questions of local interest, have made the meetings profitable to all who have attended.

STATE BOARD OF AGRICULTURE.

The birds have destroyed much of the small fruit crop and most of the pea crop. The State Entomologist was with us in July and talked upon the subject.

One route of rural free delivery has been established from Woodstown post office and two from Salem and Elmer.

Farm help is so scarce and wages so high that many farmers are seeking smaller farms.

The year has not been so prosperous for farmers as last year, the continued wet weather doing much damage.

Our statistical report was made out by a committee of four, meeting with the Secretary. I wish it were possible to get an accurate report, but it does not seem so unless a general canvass of the county could be made.

Milk shipping is the interest of the dairy farmers and poultry raising an important one, but of these we can form no estimate.

Somerset County.

OFFICERS FOR 1904.

President, E. E. COOPER, Watchung
Vice-President, BERNHARD MEYER, Finderne.
Secretary and Treasurer, ARTHUR P. SUTPHEN, Somerville.

DIRECTORS.

Bedminster,.....	C. M. WYCKOFF,	Bedminster.
	WM. C. LANE,	North Branch.
Bernards,.....	G. S. VOORHEES,	Basking Ridge.
	FREEMAN STELLE, JR.,	Millington.
Branchburg,.....	DR. J. D. VANDERBURG,	North Branch.
	HON. L. H. SCHENCK,	Neshanic Station.
Bridgewater,.....	WM. J. LOGAN,	Somerville.
	BERNHARD MEYER,	Finderne.
Franklin,.....	ARTHUR F. RANDOLPH,	South Bound Brook.
	GEORGE B. RANDOLPH,	Urston.
Hillsborough,.....	HENRY S. VAN NUYS, SR.,	Millstone.
	JOHN S. AMERMAN,	Neshanic.
Montgomery,.....	WILLIAM H. SKILLMAN,	Belle Mead.
	CHAS. HOWELL COOK,	Belle Mead.
North Plainfield, ..	CHARLES F. DEBELE,	Plainfield.
	HERBERT P. PHILLIPS,	Plainfield.
Warren,.....	WM. H. ROGERS,	Plainfield.
	MARK STOLTZ,	Watchung.

REPRESENTATIVES TO STATE BOARD.

HERBERT C. PHILLIPS (two years), Plainfield.
GEO. B. RANDOLPH (one year), Weston.

REPORT.

BY THE SECRETARY.

The past season has been rather discouraging to our farmers. The corn crop was practically a failure, oats a small crop, peaches

less than half a crop. Notwithstanding this, we hear less complaining than in former years. Our farmers are awakening to the possibilities before them. In driving through the county we observe a disposition toward improvement. Intelligence is manifestly on the increase. Many reasons may be given for this. Improvement of roads creates a disposition to improve buildings and fences; the failure of fruit trees by reason of the scale induces farmers to turn their attention to more careful crop-raising; intelligent farming by men of wealth in the county; a desire to obtain knowledge of stock breeds and stock care for milk and butter products, and more of a determination to accept the situation and a desire for better conditions.

Our meetings have been better attended, membership has increased and there is a manifest increase of interest.

We are fortunate in having a live, practical farmer for our President. At the first meeting, held on January 2d, in his annual address he aptly said, "In my opinion, if farmers would use more care in purchasing and feeding their stock, farmers who are selling wheat for seventy-five cents a bushel when it is worth from ninety cents to a dollar a bushel to feed milch cows, hogs and hens, are making a mistake."

At this meeting, also, Lloyd V. S. Conover read a valuable paper on "Poultry Raising for Profit." I give a few extracts: "Poultry raising must be learned. There is nothing raised on the farm that will give larger profit if proper care is given. Thirty hens will return as much profit as a small dairy. Hens are mortgage lifters. Thoroughbreds are much more valuable, both for eggs and market. The demand for eggs is annually increasing. Egg-producing feed must be given—plenty of lukewarm water, green bone, clover hay chopped in a cutter in half-inch lengths, plenty of grit and charcoal. When chicks are hatched, do not feed them until forty-eight hours afterward. The best general purpose fowls are Plymouth Rocks, Wyandottes and Barred Plymouth Rocks."

The next meeting was held March 29th, at which Prof. E. B. Voorhees addressed the Board upon the subject, "The Preparation of Soil and Seed for Spring Seeding." It was an interesting and profitable subject. After this a lunch was served by the

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committee and appreciated by the members. This feature has been very satisfactory, and is commended to other Boards. The social feature is profitable, and has materially increased our membership.

At the meeting held September 2d two able and interesting addresses were made by Franklin Dye and Mortimer Whitehead, Esq. The subject of Secretary Dye was "Increasing Agricultural Values." An attractive, stimulating and comprehensive address. Mr. Whitehead spoke about "Fruit." An admirable address, full of practical advice.

The last regular meeting was held November 18th, and was addressed by Rev. H. D. Opdyke, of this county, on "The Drawbacks of Fruit Culture, or the Enemies of the Fruit-Growers."

He has made a careful and extended study of this subject. We give a few extracts. "Farm life is the only one that can claim a Divine origin. Man was commanded by his Creator to till the soil. God never commanded a man to be a merchant, a stock speculator, a lawyer—these are man-made avocations. He did make him a farmer, and if farm life is not as enjoyable and prosperous as other occupations, it is the farmer's own fault. The San Jose scale, the coddling moth, the fruit-bark beetle, are enemies found in the department of fruit culture, and their destruction to fruit amounts to millions." His remedy for the pests is to boil ten gallons of water in a fifty-gallon boiler. Then slack the lime in the water, a little at a time. Stir constantly until it becomes creamy, then add sulphur, after having mixed it in a pail to a battery state. Then add salt and water, and boil the whole for an hour or more, until it becomes an amber color. His formula is 15 pounds of sulphur, 10 of salt and 25 of lime.

Sussex County.

OFFICERS FOR 1904.

<i>President</i> , THEODORE M. ROE,	Branchville.
<i>Vice-President</i> , EDWARD ACKERSON,	Lafayette.
<i>Secretary</i> , GEO. A. DICKERSON,	Branchville.
<i>Treasurer</i> , W. D. HAGGERTY,	Sussex.

DELEGATES TO STATE BOARD.

THOMAS C. ROE, one year,	Augusta.
THEODORE M. ROE, two years,	Branchville.

REPORT.

BY THE SECRETARY.

The officers named were elected at a meeting held in connection with the Farmers' Institute at Branchville, on December 9th.

The location and physical features of Sussex county offer advantages to those engaged in agricultural pursuits excelled by few sections of the country. Being within easy reach of New York and other city markets, the production of milk is the leading pursuit of our farmers.

Our elevation and climatic conditions are favorable for fruit-growing, and though the great peach industry is nearly gone from the county, the apple still flourishes, and nearly every farm has a good bearing orchard, and several young ones have been set during the past few years, which will make the apple one of our leading products a few years hence. Small fruits are receiving considerable attention near the towns and summer resorts, as is also the poultry business. This latter is yearly receiving more attention from the farmers in general. Incubators and brooders are being used quite extensively, winter quarters being remodeled and many new, improved ones built, which gives evidence of an increasing interest. There is always a strong demand for eggs

at our village markets, and the fowls, too, find ready sale, and with the summer boarder business on the increase, no doubt our farmers will continue to realize a good profit from the poultry.

Aside from a few large stock farms, which have been producing horses, principally for the market, very little live stock is produced in this county. We are raising a few colts to supply our home needs, and occasionally one for the city trade. Some parts of the county (where skim milk is available) are still producing some pork, in fact. This shows a small increase. Mutton is decreasing.

Among the cereals, only small amounts of wheat, rye and buckwheat are grown for the market, more attention being given to such crops as can be profitably fed to stock. Nearly every farm has some good potato ground, and in some districts much attention is given this staple. Some truck-gardening is carried on near the towns and summer resorts.

Speaking more fully of the dairy industry of Sussex county, the outlook is brighter than in some time past. We have a number of creameries and skimming stations throughout the county, so that it is no longer necessary for the farmers to drive long distances to deliver the milk. The price of milk at some of these creameries is at a discount from that fixed by the New York Milk Exchange. Three are owned and operated by the Borden Condensed Milk Co., of New York, which pays a stated price per hundred-weight of milk, while several other company's pay their patrons the Borden prices. There is also a co-operative creamery in Montague township, which gives excellent satisfaction to its stockholders and patrons.

The skim milk is returned to the farmers at some of these creameries and sold at reasonable prices at others, which enables them to use this valuable feed for calf-rearing or for pigs.

Decided improvements are being made in the dairy stock by the use of pure-bred sires and carefully selecting the breeding stock, preference being given to the Holstein-Friesian cattle, as their large flow of milk is most acceptable, and they consume and turn to profit large amounts of coarse fodders, such as can be easily grown at home. The silo is gaining favor, we believe, although some are not in use this year, because the Bordens refuse

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milk made from ensilage-fed cows, yet some new ones have been built this year.

Owing to a severe drought during late April and through May, the outlook for grain and hay was very dull, indeed. Corn planted at the proper season failed to come up, and that planted after the rains came was so late in starting that a very small per cent. matured, so that, generally speaking, the corn crop was a failure.

Oats crop was excellent, good, strong straw, and good yields of the grain.

Rye and wheat, fair to good crops.

Grass revived with the rains, and the hay crop, though late, was a good one. Some report not so much clover as last year, others more. Very little second-crop hay was cut this year. Pastures since the early drought have been good, continuing so until late autumn. Grass land in general looks well, going in winter. The autumn was favorable for seeding, and winter grains are looking well.

We are glad to be able to say that we have alfalfa growing successfully on at least one farm in Sussex county. Messrs. Frank Roe and son, after a series of experiments with this valuable plant, to ascertain, if possible, the secret of its growth, are so well satisfied with the result of their work on a small scale that they have this fall sown a lot of ten acres, and at present writing it gives every evidence of being a success. What these men have done we feel confident others will do, and ere long we shall see alfalfa growing on most of our farms.

The fruit crop was cut off by late spring frosts in some sections, while in others good crops are reported. It being the "off year" for apples, the crop is light at best. Peaches, cherries and other tree fruits affected much the same as apples. The former as a market crop is fast dropping from favor; the trees no longer do well, and the fruit has lost its excellence of flavor and appearance, which once characterized Sussex county peaches.

Early-planted potatoes did fairly well. The bug pest was hardly as troublesome as in some years, and they were fairly well advanced when the blight struck them, which almost ruined some late planting. This is not general, however, and good yields are reported from some localities.

Union County.

OFFICERS FOR 1904.

<i>President</i> , JAMES L. HEADLEY,	Union.
<i>Vice-President</i> , D. G. FINK,	Westfield.
<i>Secretary</i> , F. E. WOODRUFF,	Cranford.
<i>Treasurer</i> , OGDEN WOODRUFF,	Elizabeth.

DIRECTORS.

E. P. BEEBE,	Elizabeth.
D. G. FINK,	Westfield.
D. T. MAGEE,	Lorraine.

Also the President and Secretary.

DELEGATES TO STATE BOARD—F. E. Woodruff, 1 year; J. L. Headley, 2 years.
ALTERNATES—E. P. Beebe, Geo. Headley.

REPORT.

BY THE SECRETARY.

Our Board has held seven meetings during the year, the interest in which has been about the same as in the past. Among other questions discussed were the following: "Potato-Growing," "Dairying," "Legislation in the Interest of Farmers."

At the meeting of January 22d the delegates to the State Board meeting made their reports, which were very interesting.

We have been unfortunate in losing by death one of our charter members, and most faithful attendant at our meetings—Mr. John O. Magie. Mr. Magie was a dairyman and breeder of fancy cattle and swine. His stock has won prizes at a great many of the leading fairs in the country. He was one of our leading farmers, and his loss will be much felt by the agricultural interests of this county.

It is almost impossible to estimate the output of farm products of our county, as it is almost all taken to market on wagons. We are favored with good markets near at hand, and a great quantity of garden truck is grown. Complaint is being made constantly by farmers (and justly) of the high taxes which are levied to make improvements in towns and cities. For instance, in Cranford township the rate is \$3.24 on \$100 valuation. This money is used for street lights, sewers, fire department, etc., which farmers get very little benefit from.

CROP REPORT.

The past season has been a very unprofitable one, owing to the failure of most all crops. In fact, we think it has been the worst year for farmers we have any recollection of. The drought in May, the very wet, cold summer and the severe windstorms are the causes. In August a severe wind and hail storm visited us, uprooting trees, unroofing houses and damaging crops to a great extent. The corn crop is one of the poorest for years, there being only 25 per cent. Rye, 75 per cent. Oats, 75 per cent. The dry weather of May shortened the hay crop, there being only 75 per cent., but was harvested in good condition. Potatoes would have been a fair crop had it not been for the wet weather in August, which rotted the greater proportion of the crop and left only 20 per cent. Apples were a full 100 per cent., and they seemed to be larger and fairer than ever before. Pears, 30 per cent. Peaches, 10 per cent.; never so scarce before. The cabbage crop was a light one, but the price was very high. The weather was so wet and cold that tomatoes ripened very slowly and rotted badly, there being only 25 per cent. of a crop. The cannery near Elizabeth was not able to purchase enough at \$10 a ton, \$8 being the usual price.

Warren County.

OFFICERS FOR 1904.

<i>President</i> , WILLIAM C. ADDIS,	Delaware.
<i>Vice-President</i> , NICODEMUS WARNE,	Broadway.
<i>Secretary</i> , WM. EUGENE OBERLY,	Broadway.
<i>Treasurer</i> , JOHN H. ALBERTSON,	Delaware.

DIRECTORS.

SAMUEL READ,	Mount Vernon.
A. D. ROSEBERRY,	Belvidere.
HENRY PURSEL,	Phillipsburg.
FRANK HOUSEL,	Broadway.
DANIEL FITTS,	Washington.
P. B. MARTIN,	Blairstown.
IRWIN MILLER,	Harmony.

DELEGATES TO STATE BOARD.

JOHN T. OBERLY (two years),	Broadway.
SAMUEL READ (one year),	Mount Hermon.
N. WARNE, alternate.	

REPORT.

BY THE SECRETARY.

We have held four stated meetings during the past year. Topics for the meetings: "Value of Cow Peas," "Potato-Raising and Growing Alfalfa," followed by discussion by the Board. These crops, it is thought, are the most profitable that a farmer can raise. An address on "Dairying," by Franklin Dye, Secretary of State Board of Agriculture. He said there are 17 per

cent. of the farmers in New Jersey who receive their chief revenue from the dairy. To make this a profitable business it must be conducted intelligently. Look after the cost of production, the feed and care, then find the value of the product sold for each animal per year. Guess-work will not pay any longer. Business methods, calculation, debit and credit accounts must be kept with all branches of the farming business, and none more so than the dairy, if we would *know* whether we are doing a paying or a losing business. Do not keep profitless cows.

Farming in this county has become more interesting and of more importance than it has been for the last few years; farms that have been abandoned for some time have been rented and are now occupied.

Some people are getting tired of public works: working seven days a week and just about half of them working nights, and working ten or twelve hours per day, and must allow one or two hours going and returning from work, and then hardly make a living—such work is also uncertain and rents are very high.

Farm help continues to be scarce. The work is sometimes hard and the day necessarily long at certain seasons; the pay is not so small if we consider the smaller expense of living on the farm as compared with the cost of living in town or city. There the work is hard, the day long, the pay small and the expense is large, with no advantages compared with farm life.

CROP REPORT.

The corn crop was very short on account of the extreme drought which, commencing the 18th of April, and continuing until the 7th of June, followed by only two or three light showers. The late planting of corn shortened the crop very much.

Grass and oats were very light. The yield of wheat per acre was below the average.

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