# PUBLIC DOCUMENTS OF MAINE:

BEING THE

# ANNUAL REPORTS

OF THE VARIOUS

# Public Officers and Institutions

FOR THE YEAR

# 1894.

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VOLUME II.

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AUGUSTA:
BURLEIGH & FLYNT, PRINTERS TO THE STATE.
1894.

# AGRICULTURE OF MAINE.

## THIRTY-SIXTH ANNUAL REPORT

OF THE

## SECRETARY

OF THE

# BOARD OF AGRICULTURE,

FOR THE YEARS

## 1893-94.

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PRINTED BY ORDER OF THE LEGISLATURE.

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AUGUSTA:
BURLEIGH & FLYNT, PRINTERS TO THE STATE.
1894.

*To the Honorable, the Governor and Council of Maine*:

In compliance with the law of the State, I have the honor to present the report of the doings of the Maine Board of Agriculture for the years 1893 and 1894.

B. WALKER McKEEN, *Secretary*.

AUGUSTA, May 1, 1894.

# MAINE BOARD OF AGRICULTURE—1893.

## OFFICERS.

F. S. ADAMS, PRESIDENT.

A. W. GILMAN, VICE PRESIDENT.

B. WALKER McKEEN, SECRETARY.

MEMBERS CHOSEN BY COUNTY AGRICULTURAL SOCIETIES.

| | | | Term expires 3rd Wed. in January. |
|---|---|---|---|
| Cumberland County, | W. H. Vinton, | Gray, | 1894 |
| Oxford " | V. P. DeCoster, | Buckfield, | 1894 |
| York " | B F. Pease, | Cornish, | 1894 |
| Somerset " | A. R. Smiley, | Skowhegan, | 1894 |
| Sagadahoc " | F. S. Adams, | Bowdoinham, | 1894 |
| Hancock " | Vacancy. | | |
| Piscataquis " | A. W. Gilman, | Foxcroft, | 1895 |
| Penobscot " | Joel Richardson, | No. Newport, | 1895 |
| Franklin " | T. B. Hunter, | Strong, | 1895 |
| Knox " | O. Gardner, | Rockland, | 1895 |
| Aroostook " | Ira J. Porter, | Houlton, | 1895 |
| Androscoggin " | B. F Briggs, | Auburn, | 1896 |
| Kennebec " | F. H. Mooers, | Pittston, | 1896 |
| Waldo " | W. H. Moody, | Liberty, | 1896 |
| Washington " | L. G. Smith, | Pembroke, | 1896 |
| Lincoln " | John M. Winslow, | Nobleboro, | 1896 |

MEMBERS FROM STATE COLLEGE.

President, M. C. Fernald, Orono.

* Professor of Agriculture, Walter Balentine, Orono.

ELECTED BY THE BOARD.

B. Walker McKeen, Secretary.

* Deceased.

# MAINE BOARD OF AGRICULTURE—1894.

## OFFICERS.

A. W. GILMAN, PRESIDENT.

O. GARDNER, VICE PRESIDENT.

B. WALTER McKEEN, SECRETARY.

MEMBERS CHOSEN BY COUNTY AGRICULTURAL SOCIETIES.

| | | | | Term expires 3rd Wed. in January. |
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| Franklin | " | F. B. Hunter, | Strong, | 1895 |
| Knox | " | O. Gardner, | Rockland, | 1895 |
| Aroostook | " | Ira J. Porter, | Houlton, | 1895 |
| Androscoggin | " | B. F. Briggs, | Auburn, | 1896 |
| Kennebec | " | F. H. Mooers, | Pittston, | 1896 |
| Waldo | " | W. H. Moody, | Liberty, | 1896 |
| Washington | " | L. G. Smith, | Pembroke, | 1896 |
| Lincoln | " | John M. Winslow, | Nobleboro, | 1896 |
| Cumberland | " | W. H. Vinton, | Gray, | 1897 |
| Oxford | " | S. F. Stetson, | Sumner, | 1897 |
| York | " | B. F Pease, | Cornish, | 1897 |
| Somerset | " | Geo. Flint, | No. Anson, | 1897 |
| Sagadahoc | " | T. E. Skolfield, | Brunswick, | 1897 |

MEMBERS FROM STATE COLLEGE.

President, A. W. Harris, Orono.

ELECTED BY THE BOARD.

B. Walker McKeen, Secretary.

# MAINE BOARD OF AGRICULTURE.

## ANNUAL MEETING, 1894.

The annual meeting of the Maine Board of Agriculture was held in the office of the Secretary, State House. Augusta, January 17th and 18th, 1894, in compliance with the law. The following business was transacted The meeting was called to order by Secretary McKeen at 11 15 A. M., who read the call for the meeting. It was then voted a committee be appointed by the chair to act upon credentials. The following named gentlemen were so appointed: Porter of Aroostook, Briggs of Androscoggin, and Gardner of Knox.

*Voted*, To elect a messenger, and that it be done by ballot. A. R. Smiley having all the ballots cast, was declared elected messenger for the session. The committee on credentials reported as follows: W. H. Vinton of Gray, Cumberland county, S F. Stetson of East Sumner, Oxford county, George Flint of North Anson, Somerset county, T. E. Skolfield of Harpswell, Sagadahoc county, duly elected and entitled to seats with the Board for the full term of three years, ending in 1897.

*Voted*, To accept the report.

*Voted*, To proceed to the election of officers of the Board.

A committee was appointed by the chair to receive, sort and count votes, complying with vote of Board, consisting of the following: Messrs. Richardson, Hunter and Moody. Proceeded to elect a President for the ensuing year. Hon. A. W. Gilman having a majority of all the ballots cast, was declared elected President. After the second ballot, O Gardner, having a majority of all the ballots cast, was declared elected Vice President

*Voted*, The Secretary be authorized to cast the ballot for the Board in electing an executive committee. The ballot contained the names of A. W. Gilman and O. Gardner, and they were therefore declared elected.

*Voted*, That the Secretary be continued upon the Board of Advisory Council at the Experiment Station.

*Voted*, That a committee on pay roll be appointed by the chair, when Messrs. Briggs, Vinton and Richardson, were so appointed, and requested to report Thursday morning.

*Voted*, To adjourn until two o'clock in the afternoon.

AFTERNOON SESSION.

Meeting called to order by the President at two o'clock. Listened to report of Executive Committee, which is as follows:

March 2d, 1893, the Executive Committee of the Board was called to Augusta to appear before the Legislative Committee on Agriculture, in regard to the "Pool-selling bill," then under consideration. March 3d, the Executive Committee appeared before the Legislative Committee on Printing and Binding, to speak on the proposed "cut down" in the number and binding of the annual report of the Board.

March 8th the Executive Committee again appeared before the same committee for the purpose of further presenting the claims of the farmers of the State, for the present number and binding of the annual report of the Secretary of the Board.

September 7th the Executive Committee held a meeting in Lewiston, State Fair grounds, at which the following business was transacted.

Revised the premium list for the State Dairy Meeting in Foxcroft.

*Voted*, To pay the expenses of the members of the Board attending the field-day meeting at Orono, September 27th.

*Voted*, To revise blanks for secretaries of agricultural societies.

*Voted*, To request members to visit the fairs in their own county, and report their condition at the next annual meeting.

F. S. ADAMS. } *Executive*
A. W. GILMAN. } *Committee.*

*Voted*, To accept the report of Executive Committee. The report of the Secretary was next in order; the same was given and is as follows:

*Members of the Board of Agriculture*:

In presenting my report as Secretary of the Board at the end of another year, it affords me much pleasure to be able to say, I can record a fair degree of progress along all lines of farm work. The

season just past, although of a somewhat peculiar nature, has been marked by no great degree of disaster in any branch of our agriculture, but, on the contrary, would seem to be one of progress and advancement. A sharp drought, through the early part of the season reached nearly all sections of the State, doing some damage to growing crops, particularly in the central counties, but the shrinkage on these seems to be quite fully made up by a large production of others, so that no loss will be felt when all are duly considered.

The yield of potatoes, as compared with that of 1892 was 25-20, going below that of 1892 only in one county, Sagadahoc. There was but little loss reported from rust and, as far as has been learned, no material loss from rot in storage. We have obtained two reports of the use of the Bordeaux Mixture, as a preventive of rust, and these show very favorable results, both in quantity and quality of the tubers, and we hope it may be used more extensively next season.

The yield of corn both sweet and yellow, was about 16-20, as compared with last year, the largest falling off being in the central part of the State. As the silo is being introduced more and more each year, and the merits of the corn plant are being better understood, the acreage is constantly on the increase It is being raised for ensilage in some sections of the State where it would be impossible to grow and cure it successfully, thus adding another fodder crop and materially aiding the business of stock husbandry. The yield of grain has been about the same as last year The sowing of mixed grain is very much on the increase, particularly in the dairy sections, and quite a portion of it is fed without threshing. Many claiming an increase in value by so doing, as well as a lessening of the expense of hauling. I wish to say, this has been the practice on our farm for some years, and we find it a decided advantage. Although our grain was somewhat injured by rains while cutting this year, it has all been eaten and brought good returns.

We notice quite a tendency among our most successful farmers, to avoid the purchase of Western grain for feed, as far as possible, and believe this is the true course to pursue. Not by growing grain to thresh, but by the productions of such crops as shall take its place in the variety of feeding.

Machines are more in use for planting and cultivating crops than formerly, and the cost of production is very much reduced thereby.

I hope to see the using of these machines increase more rapidly in the future, and recommend the purchase of some of the most expensive, by several farmers in each neighborhood.

Corn is planted with a horse planter for about one dollar per acre, and potatoes for about one dollar and a half. The Hoover potato digger is doing good work in Aroostook county and quite a large number are in use.

The Texas horn fly which appeared in this State in 1892, and was first noticed in a bulletin from this office, has spread all over the State, doing immense damage to stock. There seems to be no efficient remedy, only preventive measures are of any avail. Kerosene emulsion, tobacco decoction, and preparations of oil, seeming to be the most effective in keeping them away from stock.

Darkened stables seem to afford but little relief, as the flies will work about as readily in the dark as in the light. We tried a sample box of a remedy, known as "Death on Cattle Fly," manufactured by the C. E Mills Oil Company of Syracuse, N. Y., with apparent good results. It costs five cents per pound in barrels and half barrels.

A writer in *Hoard's Dairyman* recommends the following preparation, which, he says, works well on his herd: three quarts train oil, one quart crude petroleum, one fluid ounce carbolic acid, applied with a sponge. But, as the principal ingredient in all these preparations is oil, they should be applied with much care, to avoid injury to stock.

The chinch bug is doing quite an amount of damage in the western part of the State, and experiments will be tried the coming season, with the infested bugs which will be supplied by the Director of the Experiment of the University of Kansas, where they have been used successfully.

The fruit crop was nearly a total failure, throughout the entire State, but as the trees of all kinds grew very rapidly, there will, with a fair season, be without doubt an abundant crop in 1894.

The Executive Committee of the Board has done good work, and rendered very valuable assistance in arranging the work for the year. They have been called together four times at an expense of $121.90. This sum includes expenses of Council at the hearing on the proposed bill for pools selling before the Agricultural Committee. Their actions at these several meetings have been a matter of record and appear in their report as presented at this meeting.

There has been one meeting of the full Board at the Bangor House on the evening of September 26th. at which a considerable amount of business was done, which was made a matter of record. Two State meetings have been held, the joint winter meeting with the Pomological Society at Union, December 5th and 6th, and the State Dairy Meeting at Foxcroft, December 12th and 13th. These meetings were highly successful, the attendance at each exceeding any meetings of the kind ever held in our State, and the interest was very great throughout.

The exhibit of butter at the Dairy meeting was pronounced by many to be the larger and more worthy, than was ever shown in the State. the quality showing that Maine dairymen are not behind in grasping new ideas pertaining to their business The same expert who scored the butter and cheese at Brunswick, was with us again this year, performing his work with the skill and good judgment which gave satisfaction to all. We were very fortunate in our speakers, both from our own State and from away Notably so in Gov. Hoard, who gave two very valuable lectures and participated in all of the discussions, and who kindly consented to attend an institute in Manchester the following day, without extra expense.

I wish to say that I learn there is being quite a large quantity of butterine sold in the State contrary to our law, which is strong enough in its provisions, but very laxly enforced

It would seem that it might be well to look into this matter, and see if some change cannot be made, which will cause it to be enforced and thus protect our dairy interests.

The publication of the monthly crop bulletins has been continued, there being a growing interest in them in all sections of the State. So much so, that our mailing list has grown from about one thousand to four thousand names, within the last year, and as we have it revised, contains names from nearly every town and plantation in the State.

The replies which have come in, to the questions, each month, show care and study on the part of our correspondents, and form, when compiled, a valuable addition to our agricultural literature. The weather summary has been maintained, and seems to add to the value of the bulletins. In addition to these monthly bulletins, weekly crop reports have been sent out, giving the condition of growing crops in the New England States. The idea being to

furnish data by which to judge of the probable demand for certain articles, and the consequent price upon the market. We have continued the practice of mailing short items relating to the work of the Board to the papers of this, and other states, which circulate among our farmers, having a list of about one hundred of them, and they are generally published in full. Our exchanges have increased during the year, and we now receive regularly, the Maine Farmer, Lewiston Journal, daily and weekly, Kennebec Journal, Portland Press, the New Age, the Northern Leader, the Turf, Farm and Home, the Mirror and Farmer, New England Farmer, the Grange Homes, New England Homestead, Country Gentleman, and Hoard's Dairyman, also Experiment Station Bulletins from every State, and many publications from the Department at Washington and the Experiment Station Record.

Before reporting the institutes for the year, I wish to acknowledge the assistance I have received from the members, and to say that each one has rendered good work in arranging and carrying out the meetings in his county, and it is to them that much of the credit for the success of our institutes should be given.

In arranging subjects and speakers, their wishes have been consulted in every case, and only in two instances has there been a failure to employ the speakers asked for, and those only for three meetings where Prof. Jordan was wanted but could not attend on account of other duties. The professors at the college have all been ready to help in the work as far as their duties would permit, and their lectures have added much to the interest of our meetings.

And I wish to call your attention to a letter just received from Prof. Jordan:

ORONO, January 15, 1894.

*Hon. B. Walker McKeen, Secretary Board of Agriculture:*

DEAR SIR: I received, a few days since, your very neat program of the Annual Meeting of the Board of Agriculture. I would like very much to attend, but shall be unable to do so. I desire, however, to express to you, and through you, to the members of the Board of Agriculture, my appreciation of the attitude which you personally and the members of the Board have taken towards the Experiment Station and its work. I feel sure that the influence of the Station and the work it is enabled to accomplish, are greatly enhanced by your cordial sympathy and support.

Wishing you continued success during the coming year, I am,

Very truly yours,

W. H. JORDAN.

In selecting subjects, while we have tried to keep the fundamental principles of agriculture in the foreground, and to obtain as lecturers those who were acquainted with their subjects, either by experience or scientific training, avoiding in every instance the theorist, who speaks only from a general knowledge of facts and conditions, as they may appear to an observer of apparent conditions, we have also tried to work in lectures relating to our farm homes and the lives of our families as well. Believing that the province of the Board is broad enough and deep enough to take in all the principles which go to make the farmer more of a man, and his home more of a place for true and perfect enjoyment, where the young people shall receive that instruction and those ideas of life and its duties, that shall make them better men and women, better citizens, as well as to make the farm more productive and the incomes larger.

Therefore the subjects and speakers have been chosen with this end in view, and the increasing number of young people who attend our meetings and the interest they manifest seem to prove the wisdom his course.

The permanent record of the institutes and the cost of each, has been continued. The time for holding the institutes reported, is from the annual meeting in 1892-3 to the present meeting, and they are as follows:

Turner Center, February 9th, subjects, "Dairying," "Agriculture in our Common Schools" and "Best Roadways for Maine."

Charleston, February 14th, subjects, "Dairying," "Cultivation of Small Fruits" and "Sheep Husbandry."

Hampden, February 16th, with same subjects and speakers as at Charleston.

Canton, February 28th, subjects, "Dairying" and "Corn Growing, Silos and Ensilage."

Andover, March 2d, Bethel, March 3d, with same subjects and speakers as at Canton.

Kenduskeag, March 10th, subjects, "Grasses and Forage Plants," "Cost of a Ton of Hay," "Profits of the Dairy," and "Sheep Husbandry."

Palermo, March 14th, subjects, "Sheep Husbandry," "Milk Production," "Corn Growing, Silos and Ensilage"

North Warren, March 16th, with same subjects and speakers as at Palermo.

No th Jay, March 17th, subjects. "Fruit Culture," "The Apple in Cookery," "Corn Growing. Silos and Ensilage," "Dairying as a Business for Maine Farmers."

Foxcroft, April 4th, subjects. "Cultivation and Care of the Sweet Corn Crop and Preservation of the Fodder," "General Principles of Fertilization," "Commercial Fertilizers."

Wales, April 6th, subjects, "Cultivation of Sweet Corn," "Dairying as a Business for Maine Farmers," "General Principles of Fertilization"

Whitefield, May 5th, subjects, "Sheep Husbandry," "Dairying and Farm Crops" and "Horticulture."

Orland, June 20th, subjects. "Cheapest and Most Effective Way of Reclaiming a Worn-out Farm," "Cultivation of Small Fruits," "Making, Saving and Applying Farm Manures."

East Bluehill, June 21st, North Sedgwick, June 22d, with same subjects and speakers as at Orland.

Solon, October 3d, subjects, "Milk, Cream and the Dairy," "Small Fruits and their Cultivation," "Farmers Wives and Daughters."

Skowhegan, October 4th, with same subjects and speakers as at Solon.

Hope, October 5th, subjects, "Milk, Cream and the Dairy," "Cattle Foods and their Relation to the Fertilization of Soils."

Washington, October 6th, same subjects as at Hope, with the addition of "Corn Growing, Silos and Ensilage."

Albion, October 27th, subjects, "Corn Growing, Silos and Ensilage," "Dairying as a Business," "What Experiment Stations Have Done for Maine Farmers."

Gorham, October 31st, subjects, "Special Fertilization," "Human Foods."

Naples, November 2d, same as at Gorham with the addition of "Dairying as a Business."

Freeport, November 3d, and North Yarmouth, November 4th, with the same subjects and speakers as at Naples.

Bristol Mills, November 7th, subjects, "Associated Dairying," "Poultry."

Waldoboro, November 8th, subjects, "Dairying," "Sweet Corn," "Poultry."

Jeffers n, November 9th, same subjects and speakers as at Waldoboro.

Liberty, November 10th, subjects "Orcharding," "Dairying and Corn Growing."

Belmont, November 11th same subjects and speakers as at Liberty.

Houlton, November 11th. subjects "Small Fruits," "State College and the Experiment Station," "Dairying," "Perpetual Succe s."

Smyrna, November 15th; Limestone, November 17th; Caribou, November 18th; Princeton, November 21st; Dennysville, November 22d; Columbia Falls November 24th; Carmel, November 27th; Garland, November 28th; Newport. November 29th; Lincoln, December 1st. All with same subjects and speakers as at Houlton, with the addition of "Oil Fields of Pennsylvania" at Princeton and Columbia Falls, and "Injurious Insects" at Carmel.

Alfred, December 4th, subjects, "Principles of Feeding," "Private Dairying." Farmers' Wives and Daughters."

Goodwin's Mills, December 5th; Lovell, December 6th; South Waterford. December 7th; Norway, December 8th; Dixfield, December 9th; East Wilton, December 11th, with same subjects and speakers as at Alfred.

Manchester, December 15th, subjects, "Corn Growing, Silos and Ensilage." "Some of the Leading Features in Successful Dairying," "Farmers' Wives and Daughters"

Bowdoin, January 15th. subjects, "Dairying as a Means of Disposing of our Hay Crop," "Principles of Fertiliza ion," question box, "What Constitutes a Successful Farmer."

New Meadows, January 16th, same subjects and speakers as at Bowdoin.

The total number is 52; total cost, $3,119.06; total attendance, 6,709; average cost. $59.99; average attendance, 134.

In addition to these institutes and State meetings, we have had an evening meeting at Farmington on March 17th, costing $14

An evening meeting at the State Fair grounds, September 6th, which was very fully attended, costing, including music for the evening meeting of the Pomological Society, September 7th, $87.50.

Field Day at Orono, at which eleven members of the board were present, costing $99.65.

On January 24th I visited the State College, with the Legislative Committee on Agriculture, and Councillor Pettengill of Oxford; the morning was spent in examining the several depar ments of

the college. In the afternoon a hearing was held, at which the faculty discussed the needs and aims of the college, the general impression seeming to be very favorable, and many words of commendation were given for the efforts of the faculty.

January 27th, I attended the joint meeting of the New England Meteorological Society and the New England Association of Applied Meteorology, at the Institute of Technology building, Boston, where the following program was given:

"The Thunderstorms of New England," by R. D. C. Ward.

"Notes on the Climateology of New England," by J. Warren Smith. an address by Prof. M W. Harrington. chief of the Weather Bureau. "Value of the Weekly Crop Bulletins," by Wm. R. Sessions. Secretary Massachusetts Board of Agriculture. President Adams accompanied me, and we found much of interest in the meeting.

March attended a meeting of the State Board of Trade at Skowhegan, by invitation of the Board, and spoke upon the subject of "How Can the Other Industries of Maine be Made More Helpful to the Agricultural Interests of the State?" This was the first time that any representative of our agriculture was ever invited to speak before such a meeting At the close of the meeting a unanimous invitation was extended the Board and State Grange to send representatives to the next meeting.

April 11th, attended meeting of Experiment Station Council.

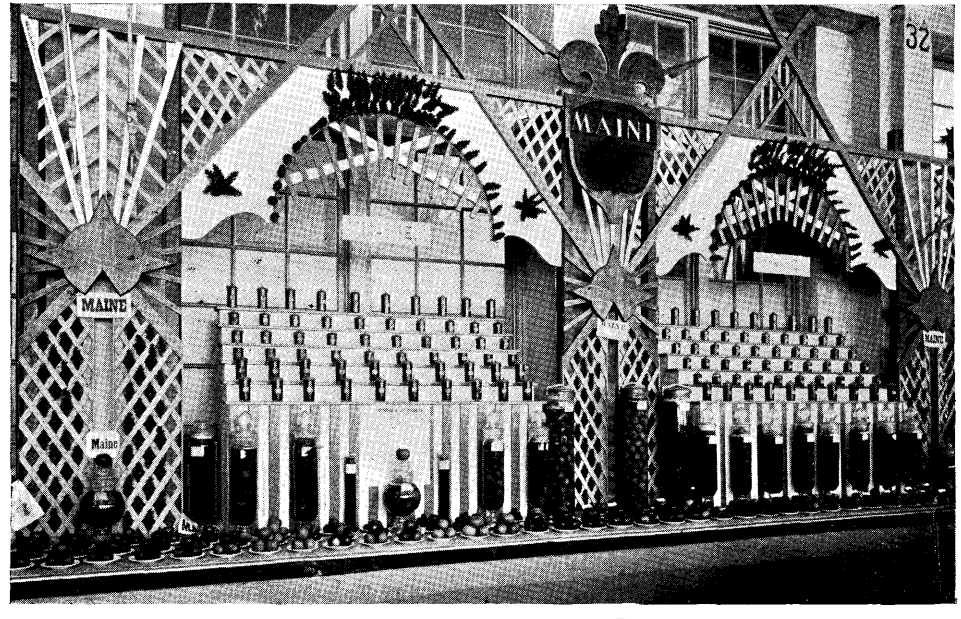
June, attended Waldo county teachers' meeting at Burnham, and spoke on "Agriculture in our Common Schools."

June 28th, attended the annual commencement exercises at Orono.

August 31st to September 3d, attended Eastern Maine Fair at Bangor, keeping the office open every day during the week. September 5th to September 8th was present at Maine State Fair at Lewiston.

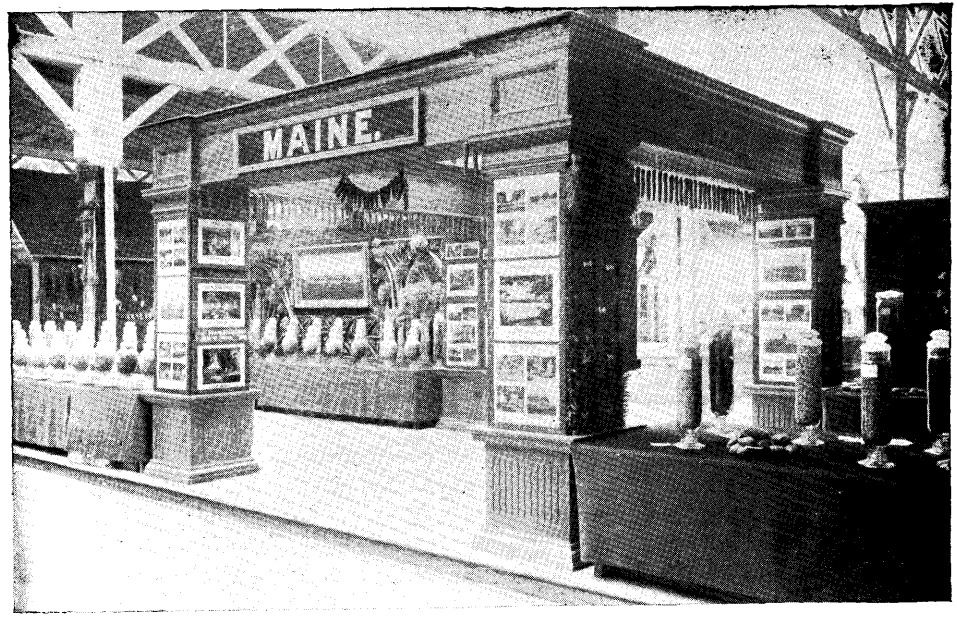
September 14th, visited the meeting of the State Board of Trade at Belfast. A very full and interesting meeting. We wish to commend the work of the Board of Trade to all who are interested in the welfare of the State.

I visited but few fairs, as my work demanded my attention at that time, and I was absent on a trip to the World's Fair in October, having been appointed by the Governor a delegate from the State of Maine to the World's Agricultural Congress, which con-




THE HORTICULTURAL EXHIBIT.

[At the World's Fair.]




THE AGRICULTURAL EXHIBIT.
[At the World's Fair.]

vened at that time. I prepared a lecture on the "Agricultural Resources of Maine," which was given at a fully attended meeting in the hall of Columbus on November 18th. These congresses were of great value, and as there were representatives of the agricultural interests of very many countries present, much of value was presented. They were well managed and well attended. The proceedings will all be printed in pamphlet form, and it is expected, will be embodied into a report by the federal government and distributed as a public document.

It may not be out of place to say here, that as there was no appropriation for this purpose, I paid all my own expenses, and in fact, I have received nothing for any work I have put into the World's Fair business, from the Commissioners, or from any other source. Nor have I asked or expected anything.

The sum of $1000 was apportioned by the World's Fair Commissioners to pay for the collection and shipment of agricultural products, and through the generosity of the farmers in our State, who responded liberally to the call for articles for the exhibit, a fairly good collection was obtained for the latter part of the exhibition. It is certainly safe to say that much of the grains and grasses sent were equal to any seen on the grounds, and the display of Aroostook potatoes was fine. But the newer states of the West, who seem to be in the show business, and who had large sums of money at their disposal, made a showing far superior to any that went from the East. And, as much of the effect depended upon the setting of the exhibit, and they had in their employ constantly skilled artists to arrange and keep in proper condition their displays, they were able to lead by quite a large margin. An agricultural map of Maine was on exhibition there as coming from our Board; also, various photographs of farm buildings and scenery. A full set of our reports, bound in library style, something not seen in any other State, and 1,000 copies of the bibliography of the State were distributed. These books and the map cost one hundred and seventy-five dollars only, and this amount with about twenty-five dollars for clerk hire, and about thirty-five for stenographer, is all that was taken from the $1000, for other than expenses of collecting and shipping the articles.

Too much credit can not be given the Messrs. Ricker of the Poland Spring House for work done in decorating the agricultural

exhibit, and many others who generously donated articles, are worthy of commendation. Particularly I. T. Waterman & Sons of Auburn, H. S. Hardison of Caribou, and Alonzo Butler of Union

As will be seen, no radical change has been made in the arrangement of the institutes. More advertising has been done, and it is our purpose to advertise still more fully sext season. Several speakers of reputation from outside the State have been employed, and we think have done good work for us. Mr John Gould from Ohio, who spent the month of November in the State, is a well recognized authority on dairying, and in every one of the institutes he visited he created a good degree of interest in the subject. The lady speakers, who treated more particularly the subjects connected with the home, did excellent service. I had arranged for another class exhibition by Miss Wilson, but on account of sickness, she was unable to give it The following is a list of the new speakers employed, with their subjects.

O Meader, Albion —"Dairying."

Willis A. Luce, Union—"Small Fruits."

A M. Spear, Gardiner—"Farm Law."

John Gould, Ohio—"Dairying and Corn Growing."

Mrs. Alonzo Towle, Freedom, N. H.—"Perpetual Success."

Mrs George R. Chase, Medfield, Mass. - "Farmers' Wives and Daughters."

Prof Carl Brann, Bangor—"Injurious Insects."

And President Harris, who spoke at Lewiston and Foxcroft.

In reviewing our work I believe I can say that we have had very good success. The attendance has increased, and the interest in the questions treated have created quite a large amount of interest. So much so that we believe we have accomplished something at every place where we have held meetings.

We have got the returns all in from agricultural societies, and have prepared a table showing something of the work they are doing, and for what purpose some of the State stpend is used. It seems that something should be done by the Board, and I recommend that they carefully consider the matter and take such action or make such recommendations to the next legislature as they may think proper. There seems to be a endency for the agricultural societies and the Board to drift apart.

The grange, all through the State, so actively co-operated with us in the institutes, and so generally furnishes halls, that the cor-

respondence and advertising is mostly done through their members, rather than through officers of agricultural societies.

We have sought to interest the societies in the work by correspondence and consultation, by placing their names on our mailing list, etc., but wish that more might be done to put us more in touch with them, and I hope the Board will fully consider this matter.

In closing, I wish to say that the general outlook for the farming interests of our State is very flattering. The creameries are rapidly on the increase, and those already established are doing an increased amount of business and selling their products for good prices. Dairy cows are in quick demand at good prices.

However, we note with regret, the building of a few expensive creameries in our State, by agents of foreign corporations in localities where smaller plants would do the work as well, with a consequent discouragement and disappointment which injures the business.

We would say, earnestly, to all who are interested in dairying, or in establishing a creamery, co-operate with yourselves. Avoid strangers, who are probably interested parties, who seek to organize creamery companies for you, (and I think this statement will hold, when we are seeking to form companies for the purchase of stock, horses or anything else.) If you are not quite sure you can start a creamery or cheese factory, appoint a committee of townsmen of good business capacity to investigate either personally or by correspondence, such creameries as you may select, and report their conclusions. Do this at your own expense, then you will be under no obligation to anyone when you come to purchase your supplies. I would also consult (or visit, if possible) our State Experiment Station officers, who are all interested for you, and will freely give all the information in their power. Be on your guard against any creamery supply company that you do not know. Deal only with those whose reputation is well eatablished, and who are known to you. In this way you will be starting right, with fair prospects for success.

All crops grown on our farms are commanding ready sales. The horse industry is still changing for the better, by the selection of heavier sires, and a more careful consideration of the necessary qualities in the dam. The demand for good, medium-sized roadsters and gents' drivers is good, and at fair prices, and as our most undesirable animals are weeded out, we look for a renewal of

interest in the business, which shall give it an impetus which will make it very profitable.

Poultry raising is quite rapidly on the increase, and as reported by our bulletin correspondents, is very profitable. The increasing number of silos and the consequent increase in stock-carrying capacity of our farms, can but tend to make them much more profitable, as it lessens cost of production, by enabling the farmer to produce more of his food at home. I believe the steady improvement predicted last year has been fully realized, and I confidently look to see it continue for the years to come.

B. WALKER McKEEN, *Secretary.*

The Board, after remarks from Prof. Balentine, W. H. Vinton and Joel Richardson, voted to accept the report of Secretary McKeen.

*Voted*, That the Executive Committee constitute a committee to investigate the matter of distributing the annual report of the Secretary, and devise some better method, and report at the next annual meeting. It was also voted that the same committee be empowered to investigate the report of the large sale of bogus butter in the State, and report at the next annual meeting.

The question of each member being instructed to visit the fairs in his own county, was sharply discussed by Messrs. Balentine, Porter, Vinton, Winslow, Smith, Moore, Flint, Moody and Richardson, when it was voted that the question lie upon the table until to-morrow morning at nine o'clock

*Voted*, That a committee of three be appointed by the President to consider whether it is desirable for the Board to direct, for what purpose, or purposes, that part of the State bounty under its control shall be expended by the agricultural societies. Messrs. Richardson, Hunter and Smith, were appointed as that committee. After some discussion, it was then voted that the Executive Committee of the Board shall be increased by one, and that he be elected by the Board. Proceeded at once to elect, and B. F Briggs having all the ballots cast, he was declared duly elected a member of the Executive Committee.

*Voted*, To adjourn until Thursday morning at nine o'clock.

Secretary's office, Thursday, January 18, 1894, nine o'clock A. M. Meeting called to order by President Gilman, who called Vice President Gardner to the chair. Committee on pay roll reported, and same was accepted.

*Voted*, To take from the table the matter which was placed there by vote the day before, in regard to members visiting the fairs in their own county; and it was also voted that the following be substituted for the motion of yesterday.

"That the Board instruct each member of the Board of Agriculture to visit each of the incorporated fairs in his county, if dates and distance permit, and said member make such memoranda of the methods and general features of said fairs as may occur to him, send the same to the Secretary of the Board, who shall incorporate as much as he shall deem of interest into his annual report. Actual expenses of said member shall be paid by the Board."

This question was discussed by Messrs. Vinton, Smith, Moore and Moody who offered the substitute, also by Skolfield, Richardson, and Winslow. It was then voted upon and passed. A recess of ten minutes was then declared for the purpose of greeting President Harris of the State College, at the expiration of which President Harris was introduced and spoke upon the subject of "The Relation of the Board to the State College and the Experiment Station." Then followed a discussion upon the suggestions offered by President Harris, opened by A. W. Gilman, followed by Messrs. Balentine, Smith, Moore, Flint, Moody, Vinton, Porter, Richardson, Winslow, Briggs, Hunter, Dr. Twitchell, W. P. Atherton, S. L. Boardman and Secretary McKeen

*Voted*, To adjourn until two o'clock in the afternoon.

AFTERNOON SESSION.

Meeting called to order by acting President B. F. Briggs, at 2 20 P. M. The committee to which the matter of State bounty was committed, reported. There were two reports presented, the Board voting to accept the majority report, which is as follows:

"The majority of your committee report, that in their opinion, the societies are the best judges as to what purpose State bounty shall be used."

T. B. HUNTER,
L. G. SMITH, } *Committee.*

It was then moved to substitute the minority report for the majority report for the purpose of discussion. The following is the minority report.

I recommend that the Board direct all agricultural societies receiving State bounty to award and pay premiums amounting to

one-sixth of such bounty received by the society for dairy products and appliances, and one-sixth for fruit exhibits, and one-sixth for field and garden products.

JOEL RICHARDSON, *Committee.*

The discussion was opened by Mr. Richardson, followed by Messrs Flint, Moore, Moody, Winslow, and Dr. Twitchell, when it was voted not to adopt the minority report for the majority report.

*Voted*, To reconsider the vote whereby the Board voted to instruct each member to visit the fairs in his own county. After further discussion it was voted the whole matter be left in the hands of the Executive Committee. The next topic on the programme was "Shall the Board Catalogue Abandoned Farms?" Discussion opened by T. B. Hunter, followed by Balentine, Secretary McKeen, Vinton and Skolfield.

Prof. Balentine here presented the following resolution, and it was unanimously adopted:

"WHEREAS, This Board has just been informed of the critical illness of B. F. Pease, Esq , of Cornish, member of the Board from York county, therefore,

*Resolved*, That we wish to express our heartfelt sympathy with Brother Pease in his sickness, and our sincere hope that he may be speedily restored to health.

After some further discussion it was voted to instruct the Secretary to catalogue the so-called abandoned farms of the State.

*Voted*, That the Board extend a vote of thanks to the Maine Central Railroad, the proprietor of the Cony House, and all others who had contributed to the success of the meeting.

*Voted*, To adjourn without date.

B. WALTER McKEEN, *Secretary.*

## THE RELATION OF THE BOARD TO THE EXPERIMENT STATION, AND SUGGESTIONS FOR FUTURE WORK.

By President Harris.

*Mr. President and Members of the Board:*

I did not plan to say very much in regard to the Experiment Station, for the five things that I propose to refer to are matters that have very little to do with the Experiment Station You know when a foreigner visits this country the first question asked him is, what his opinion is of its people and its institutions. Of course he knows a great deal less about the people and the institutions than the people themselves. I am very much in the position of the foreigner. It is only about five months since I came into the State to reside in it. There is a famous story in regard to the principle which Roswell Smith, the publisher of the Century Magazine, applied to the impressions of wood engraving. Wood engraving had made great improvement from time to time, especially under the encouragement of the Century Magazine until it seemed impossible to carry it any further for this reason: the cuts were always printed upon wet paper. After the lines had come to a certain fineness, it seemed to be useless to make them finer for the paper spread and so widened even the finest lines.

One day Mr. Smith went out into the printing department and made the suggestion that they should print on dry, instead of wet paper. The printers said that would not be possible, that every printer knew that they must print on wet paper, there was no other way to do it. Mr. Smith insisted, and ordered that they should print them dry, whether they could or not. As luck would have it the whole solution of the question had been reached. There was some little difficulty in printing it dry at first, but the trouble was overcome and it gained ground very rapidly. Certain things occur to me in looking over the agricultural interests of the State. It may be that they are impracicable. I shall suggest them, however, and maybe there is something in them that is practicable. One of the first things that occurs to me is the dairy interest. From what I know of the State, it seems that the dairy interest must be very much greater than it was. I know that creameries have been increased, but yet we are behind other states that have had no great

advantages. I made inquiries, and when I went to Chicago I had a long talk with Professor Henry of Wisconsin.

The great advantage of the Wisconsin creameries had been the bringing in of uniformity of product. Until recently the butter and cheese of Wisconsin was very variable. One man made good cheese, another bad cheese, one man made good butter, another bad butter Consequently Wisconsin butter and cheese had no reputation. A strong competition had come in between individuals. The dairy association undertook to make an improvement, and a dairy school was added to the University of Wisconsin They met with very great success; the first year they had forty pupils, and since then they have had one hundred in the school. That seemed to me a puzzle because in the State of Maine we have succeeded in getting very few into the school. You may think that our equipment is not as good as theirs, but it is. It is only recently that I came upon the secret of the success of the Wisconsin dia y school. Two things were greatly in favor of the school In the first place the great interest which existed in the State Dairymen's Association. In order to bring a uniform method into the dairies and creameries throughout the State, they made the resolution that so far as possible, they would employ as managers only those persons who brought certificates from the dairy school. I suppose in the beginning they were not able to abide strictly by this rule, but I am told by Governor Hoard that they are to-day practically all graduates or members of the school. In the second place, the dairy school of Wisconsin had forty scholarships, which covered the entire expense of forty pupils. This indeed accounted for the fact that in the beginning the school had almost exactly forty pupils. I am certain in the long run it is safe to let pupils pay the greater part of their own expenses. I want to suggest to this Board that it would be well to make the action of the Board in this particular similar to that of Wisconsin, and also bring about a dairy or creamery association, to bring about a uniform product of the dairies and creameries of the State of Maine, so that we can bring up the reputation of their produce as a State produce. Governor Hoard told me he had no doubt that the dairy association had added two cents per pound to the butter in Wisconsin. It is a fact that the course taken by that State has been highly profitable. Without taking any more time on this subject, I want to mention the one which has been long neglected. Before I came to Maine I

knew the reputation of Maine potatoes In the city of Washington, if we were sure we had Maine potatoes we were always willing to pay a little more for them than for any other kind. I fear it was very hard to make us confident that we were getting Maine potatoes. I have wondered, without attempting to carry out my ideas to practical details, whether there might not be some way in which, in this State, we could bring about coöperation in the sale of potatoes—possibly following in general the plan which Florida people have in regard to oranges. I am informed that there is a board of trade which passes certain rules for crating the oranges, in regard to size, quality, etc., so that when the oranges have once been crated they are marked as a certain grade, so that oranges that go out of the State may be relied upon for excellence in certain particulars. Now it seems that through some such means we might devise a certain standard in regard to Maine potatoes, so that people outside the State may purchase Maine potatoes with certainty; so that they may determine from the packages in which the potatoes are packed just exactly what the size and quality ought to be I make the suggestion for what it is worth. It seems that practical business men might struggle with such a question and really increase the production in this State. Another thing which I want to suggest. It seems to me the poultry interest in this State ought to be fostered. It seems to me that the poultry industry and the dairy industry ought to be carried along together. The waste product from the dairy can be utilized in no way better than as food for poultry. Edward Atkinson, who is an extremist, but who is also a practical business man, says that the skim milk of the dairy can be turned into poultry at a much greater profit than into pork He says it is very nearly a perfect food, and by mixing with some of the concentrated foods it can be made quite a perfect food. We certainly, in Maine, ought to be exporting a very large amount of eggs and poultry. I believe with proper fostering that can be brought about Another suggestion is a borrowed one from the experience of Massachusetts. I can see no reason why it is not a good one. We make at considerable expense careful analyses and tests of the artificial fertilizers used in this State. We have come to the agreement that the testing of fertilizers pays. If we did not make that test there would be every year put upon the market fertilizers, that would sell for more than they are worth. Every year concentrated food stuffs become more important. The feeding value of these

food stuffs varies almost as largely as the fertilizing value of the artificial fertilizers. It seems to me quite proper to do with the food stuffs that we use for animals just what we are doing with food stuffs we are using for plants, at least it would be well to investigate the feeding value of feeding stuffs used in the State. One other matter that has already been urged to the station is the necessity of teaching the farmers throughout the State the practicability of making their own fertilizers instead of buying complete fertilizers.

One other matter I want to mention and then I am done. I don't know whether you agree with me in this matter or not. It is one which has for a long time been a favorite with me. One great objection to life in the country is its isolation and the fact that it is largely cut off from the rest of the world. The tendency of modern investigators is toward a change. I believe we can do nothing better for agriculture than to hasten improvement in this direction. One advantage of life in town is one rubs against other men. He sees papers and reads books. In the country much may be done to bring about a meeting of the people. Much is being done. Much may be done also toward further reading of books and magazines. In all large cities and most small cities, the public libraries foster the reading of books and current publications, but in the country it is apt to be considered as almost impracticable to establish public libraries I see no reason why the State should not foster in the principal county seats, the principal county towns, county libraries, which shall be primarily for the use of the farmers, or why it should not provide for the establishment of libraries in post offices of small towns and villages, or perhaps in the country store, or in the farm-houses, where a large number of books could be distributed among the the farmers. The expense to the State ought not to be very great. I suppose a slight encouragement from the State would bring from the farmers themselves some active response. It seems to me that the State Board of Agriculture can and ought to encourage and foster so far as it can, the establishment throughout the State of Maine, of libraries which shall bring about a general culture and increase of intellect in the agricultural population of our State.

A W. GILMAN—Mr. President: When the secretary said that he would call on me, some two weeks ago, asking me to give my views of what the experiment station had done for the agricultural

part of the State and the good work it was now carrying on, I accepted it with a good deal of pleasure, and devoted some time to looking up what they had done and taking some pains to give my views to the members of this Board, and it is a great disappointment that I am not able to talk on this subject. It is certainly impossible for me talk from the condition of my throat. I am sorry I cannot speak on this topic I am deeply interested in it and my interest in the college and its professors has been such that I think that I could have said something that would have been of interest to this Board.

Prof. BALENTINE—I know some of us are accused of running this meeting. The president of the Board told me Saturday that he run this whole institution, and said that he did not think he was capable of running it alone. Brother Smith from Washington county has blossomed out as a man who can take up time and I was in hopes he would pitch in here. One point that President Harris of the college mentioned I am considerably interested in, and that was the method that the Wisconsin Agricultural College took to get students, that is to get a class of forty by paying all their expenses to come to the institution and take the course. This is taken up further by the State Dairyman's Association insisting that no one shall take charge of a creamery or cheese factory without having a certificate from the Wisconsin Dairy School before they are allowed to go to work. The result, no doubt, has been of great advantage to the state of Wisconsin and increased the price they got for their butter and cheese. It was said a few years ago that one cheese factory made the statement that it actually increased the value of the product of that factory two cents a pound. There is no doubt that we have some first-class butter factories in the State of Maine that are getting as high prices for their butter as is obtained from any factory in the country. But I see no reason why every one should not get just as high price for their butter as the best. Now I would like to know, and would ask our practical Brother Smith, for instance, whether it is a practical thing for this State to establish a state dairyman's association that could run this thing in that direction? We had, a few years ago, a state dairymen's association, I believe it is dead now. I would like to have the members of the Board give their views on this point in particular.

Mr. SMITH, of Washington County—It is not necessary for me to state that I am a very modest man. I am very apt, if I under-

take to talk to ramble and go over a good deal of ground, not meaning much First I will state that last year I went down to Orono and passed a very pleasant day, and the only thing I regretted was that I did not have another day to investigate, to look around and fi d out what they had covered up that we didn't see that day. I went home feeling pretty good. I went to the grange after I got home, of course I had been up to the State College and they wanted to find out what I knew about it I got up and launched in the best I could and said all I could for the benefit of the school what I thought about the farm, and how to harvest potatoes, etc. Then if those fellows didn't begin to take me up in regard to the thin_s I spoke of, and before I got through I was lame I thought my speech had not amounted to much, and I wished I had not made it. They said we have got a lot of professors up there paying them big salaries that probably could not make their living any other way. If you should give them the best farm in the State they could not make the r living. The fact is the state farm is not self-suppo ting. They l ave to have the State to back it up It took the wind out of my sail. I had to give it up.

I will touch upon his dairy matter. I am not prepared to express just how I feel about it. If in some way associated dairying could be brought about in our county, I believe it would be t› a great extent a very great benefit to the dairymen of Washington county. It has been said that just as many dairies as there are in Washington c unty just so many grades of butter are made. The man who makes a good article gets a fair living price, and the man who makes poor butter gets a poor price. If the State can lend its aid in some way, and bring about associated dairying, I think it would be a great help and I would lend my aid in that directi n.

Mr. F. H. MOOERS, of Kennebec—I don't know as I can add anything to what has already been said. I am not much interested in dairying myself, in fact it is not much of a dairying loc lity where I live. Though we have a creamery in our town there is not as much done in dairying, as in other branches of husbandry. I w ll say that I have been very much pleased with the remarks made by President Harris and the theories he has put forward; they are very valuable. In regard to the potato busines-, I thi k to some farmers it is a very valuable suggestion. I know from my own experience, I have seen i in Boston markets, have s ld vegetables in Boston some fifteen years, and I know myself, that if they

could get hold of potatoes that they knew came from Maine, that were handled carefully, they were willing to pay at least twenty-five cents a barrel more than from any other section. But as President Harris says, they were not always sure that they were getting Maine potatoes. Many of our potatoes are spoiled in getting to the market. In the first place, they dump them into vessels, walk over them and shovel them over and spoil the potatoes before they get to the market, and usually such potatoes are not sold as Maine potatoes. The potatoes that do come into Boston in good shape are Maine potatoes no matter where they come from. Now potatoes taken from the field and dried off carefully, handled as carefully as you would handle apples, put up in barrels or boxes and put into our large markets that way without being bruised, just as good shape as when they came from the field, will actually bring twenty-five to fifty cents more on every barrel than where they were sent in bulk in vessels to be walked over and spoiled. I think this question is worthy of considerable attention. If some means, as President Harris has said, could be devised whereby potatoes could be put on the market so the consumer knew they were getting Maine potatoes, the farmers of this State could get very much more for them than at the present time. The same rule could be extended to various other products as well, even to eggs. Fresh eggs coming from a short distance bring more in large markets, than when they come from long distances, so with almost everything that you could put on the table for consumption. I don't know as I can add anything in particular to what has been said, and I will sit down.

Mr. GEORGE FLINT, Somerset—When President Harris was speaking on the social question I saw no solution of that excepting the natural tendency to concentrate, move together, live in small villages and farm out. I think we see something of this tendency to-day. Many farm buildings are not rebuilt after being destroyed by fire or otherwise, or if they are rebuilt they are rebuilt with an eye somewhat to the locality of the same in relation to sociability. They will change to a position somewhat nearer the neighbors, where they can concentrate more. In many cases they live in villages and drive out to attend to their farms. These men love to live thus because it is every man's particular interest. Every man is his own landlord, his own master, for he owns his farm. Among all people on the face of the earth the farmer is the least disposed to accept the views of others, for the reason that he has not learned

to accustom himself to the views of others. We find that farmers are the hardest men to convince.

Mr. VINTON—It is the same old story, I talk when nobody else wants to talk, and sometimes when they do want to. But, on this occasion there is one thing I want to say. You know enough about me to know that I state my views so they are understood. The point I want to talk about is one I am exceedingly troubled about, myself, personally. Now the matter that troubles me is, just what position this Board ought to take in relation to the State College. I have said a good deal upon it. I have hid a great many corners, but you have heard what Brother Smith said. We have got to take things as they exist, and be governed somewhat by them. We may say they are all wrong, but since the thing exists and we cannot repair it or overcome it, we must accept it for the time being Now it is undoubtedly true that there is and has been a great deal of opposition to the State College by the farmers of this State. I live in Cumberland county, where they ought to be as intelligent and as advanced as any county, yet to-day, if you will submit to the farmers of my county the question of the State College at Orono, and get an expression, make them vote, they would vote it out of existence root and branch. I have no doubt about it. They always say don't put the State College at Orono on to us. They educate no farmers, they say, nobody goes back to the farm. You are getting an immense fund to pay professors, you have lots of professors, more than you have students. It is not a farmer's college. It is not ours. Now you go into the legislature. The State College comes to the legislature for an appropriation. Must have money, can't get along without it. They come there in need. If their request was submitted to the farmers of the legislature they would not get a dollar. When the matter comes up before the legislature the lawyers, doctors, merchants and manufacturers there come to the rescue. Last year, a representative from my town, represented two farming towns in that district He got up to make a little speech, and he referred to this State College at Orono where they killed cattle on scientific principles. Now that is the class of things that exists. Now just what ought to be the position of this Board in relation to the State College. Take an illustration: At Foxcroft recently they had a dairyman's meeting, where the dairymen came with their butter and cheese, etc , and ex-President Fernald made a speech. He referred to the college with an exhibition of just pride and

called the attention of that meeting to the programme of the meeting and said, "You see what the State College is, you see the position it occupies upon your programme for this meeting." I don't make any objection, but I know of a great many men and women in that meeting that didn't take kindly to that remark. They were displeased with it. Why it was I do not know. These dairymen said "the president and the professors talked about the college and its experiment station, its albumen, its nitrogen, etc." What do these fellows know about butter. Now just what position this Board shall occupy with reference to the State College is a question that bothers me. We cannot go in with these farmers and oppose these things. That is going back to the Dark Ages and we are for progress. It is an unfortunate state of things with our agriculturists that they do so hang back on to the Dark Ages. They won't progress. Now this board of agriculture must stand by the State College whether our constituents approve of it or not. The State College must stand by us, we must work together. Now just what prominence in our mee ings and upon our programmes we shall give to the State College, that is the question. I have come to the conclusion, everything taken into the question, the college upon one side, our duty to it, and the warped state of things we run against in the agricultural affairs of the State on the other, that an estimate of just the position we should occupy should be a fair medium, if we can. Let everybody understand that the college at Orono is the college of the Board of Ag.iculture of the State of Maine. In our meetings and programmes we will not make the matter so prominent as to create offence. We don't want offence, but we do want a kindly state of feeling with each other.

Prof. BALENTINE, Orono—Mr. Chairman: I think that the secretary's course in regard to building up this programme has been a very good one. He has not thought proper to place the college on the programme in such a way that it could be in any way offensive. For this reason he sent out, the first of the year a list of the lecturers that were available for him. You as members of the Board have yourselves, from that list of lecturers, made up the programmes to a greater or less extent. Mr. Vinton called on two of the members of the college to come into his county and I was very glad that he did, very glad on my own account and would say that wherever there was an audience gotten together to listen to us, we were well received. That was the case everywhere. In regard

to the programme at Foxcroft, I don't know how it was arranged, whether the secretary made it out or not.

SECRETARY—I made up that programme myself.

I believe he made it up because he could draw good work from the college at small expense. The meeting as it was, cost $300, and not very much money went to those men that came from the college

SECRETARY—Only their traveling expenses and hotel bills.

I think the gentleman from Cumberland is mistaken on the point, every time and all the time, that if a vote on the college appropriation was left to the farmers in the legislature it would be defeated. In fact I am very certain, one year the appropriation was granted on account of the vigorous work done by the farmers in the legislature. I think so far as that is concerned we are gaining ground with the farmers There was a time when Mr. Vinton was in the legislature, when the college would have been wiped out of existence if it had been left to the farmers of the State of Maine. I think if the Board continues in the position it has held for several years, that the farmers will eventually be in the right and we will eventually have students in agriculture at the Maine State College. I believe the real reason that we don't have students in the agricultural department, is these farmers themselves, believe the business is not profitable, and that they can't afford to spend $1,000 on a boy, or $800, or $600 even, to give him a thorough education, and then let him go back on to the farm. We graduated last June a young man, as I told you at the field day meeting, who went out from the college course, went out with the firm determination that he was going to farming; went back to his father and told him he was going to do that; he said, "young man, then you have wasted your time and your money," and when the neighbors heard of his decision they all came around and said "don't be a fool" "if that is all the good the Maine State College has done you, you might just as well have stayed at home." While the majority of the farmers in the State feel in that way you will have but very few students in the agricultural course. I don't care if you offer a premium, if you make a condition that they go back to the farm, there will be still no great number of students in the course. We always have a few, and always have a few that go back to the farm. There was one of them elected alternate member of the Board from one of the counties. He has been at work and doing

good work for five or six years on the farm. I saw him last spring on that farm, he was perfectly satisfied that he was doing as well as any of his classmates who had gone out in engineering work where they started in with all the way from fifty dollars to one hundred dollars per month for their work. He said that his time has not been wasted, that he has gained something there that was enabling him to get as good, or better, living than any of his classmates.

The point should be that the Board should sustain the college, and then insist that it should be better.

Mr. I. J. PORTER, Aroostook—I was much interested yesterday in our secretary's report. There were things that he suggested that brought out a good deal of discussion. This morning in the President's address he gave us some ideas to think of; ideas that we cannot act upon to-day, but something we can carry home to think of and digest at our leisure In regard to the college farm, I went there from an invitation from the secretary. I went there under instructions from the grange to look about and see what they were doing I went there and had a general view of the farm. It did not impress me so very strongly as some individual farmers' farms would. But they didn't take the wind out of my sail as they did out of Brother Smith's, by a good deal. I had attended the President's address and the professors' talks, and had taken notes, how many farmers' boys they had graduated. They have gone out; every one are in good places now—are earning good pay. The farmers say they don't graduate any farmers. An individual going to that farm one day don't know what the circumstances are, they don't know what that farm is for. I was talking with a member of the grange not long ago, and he thought that that farm ought to be self-sustaining, raise crops, feed all that stock, etc. That is not what that farm is for. It is not there to pay the bills of the overseer and help. It is there to experiment on, and the stock is not there for the purpose of making money. We, as farmers, should not let it go out as a failure It is a grand institution and doing good work for the farmers and the farmers' boys. One reason that we don't have so many pupils is that it is not so popular. One wants to go to a school where it is more popular. We as members of the Agricultural Board want to make it more popular.

JOEL RICHARDSON, Penobscot County—The discussion was to be upon the address of the President. It has gone a little outside of

that, still in the line of it. As far as the relation of the Board to the college is concerned, I can only say that as a member for my county it seems to me that they are, or ought to be, working in the same line, to elevate the character and increase the profitable results of farming in Maine. We are too apt to look over and beyond the effect of this or that, and leave the truth at our feet. In general practice in the world we have learned, or ought to learn, that success can only be obtained by building upon certain underlying principles. The principles are worthless alone, but when once thoroughly obtained, thoroughly understood, we have the bottom rock, the foundation on which to build. We always have something by which to test this or that theory. The college has done much for us in that direction. Now to practical points. The college has done all the testing of fertilizers. Any man who has used fertilizers and studied their nature and the result of their use, is well aware that all money that has been expended in the college has come back to Maine in the quality of commercial fertilizers. Had there been no oversight, and the manufacturers had had every opportunity to place their goods upon the market, we should have been jewed year after year, year after year. As fast as we found out one fraud, something under another name, and from another firm would have been hoisted upon us. We have more than got our money back in that direction. There was one little experiment, made before we had any experiment station, feeding of pigs. When I was a boy, in fact after I was a man, it took an hour or two every day to cook and prepare the food for swine. That college began to experiment, comparing cooked to raw food, and they have well established the principle that it is as well, perhaps better for the swine to be fed on uncooked food. That they fully established the theory, go out among the farms how many of those old barrel boilers do you see to-day? It has gone universally into practice. They don't give the college any credit for it but that is where it originated. In the college we should praise where they deserve praise, and fairly and kindly criticise where we think it requires criticism. It is said our best friends are those who criticise. Yes, if done in the right manner that is true. If we awaken opposition it may be an injury. So much for the experiment station. Now with regard to a dairy association for the State of Maine, it seems to me that there is a tendency to divide things up too much. The Board of Agriculture is a pretty good dairy asso-

ciation. Nearly one-half of its work for the past seven or eight years has been done in that direction. It is true that they have started the work well along toward success. Ten years ago Maine butter was almost unknown with the exception of a few private dairies. To-day we have quite a number of creameries that stand as well as any others. But I believe it is not wise to establish a dairy society, but that the Board should carry on this work and keep it before the people. One thing in regard to libraries: as President Harris has so recently come among us, I would like to say that I hardly know a town that has not a public library of some kind—many of them two or three. The difficulty now, is not so much the want of books as to acquire the taste for reading them. It seems to me that we should try every theory that comes up by some thorough, practicable and sensible principle, and then adopt or condemn it, as we find it best. These are some of the things in which the Board can work in connection with the college. It has been said here, and said at Foxcroft by President Fernald, and it is true, that we have a great deal of very valuable instruction from the faculty of that college in our farm work all over the State. We must not overlook that fact, and in judging the work of the college let us as members of the Board, be candid in our opinion, praise where we think praise is due, criticise kindly where we think such criticism may be a benefit.

Mr. WINSLOW, Lincoln County—I will say I am heartily in sympathy with anything that pertains to the welfare of agriculture and I have been pleased with the remarks to which I have listened. I am very much interested in the matter of dairying from the very fact that I am not engaged in it as largely as I would like to be and as I should like to see the members of my county. I would like to hear from the members from the different parts of the State on this question and will not take up any more time myself.

Mr. SCOLFIELD, Sagadahoc—Asked to be excused.

Mr. BRIGGS, Acting President—I will simply say that I am a believer in the State College and always have been. If we are believers in it and if our neighbors think it is wrong, I think it is our duty to tell them what we have from it. I have no feeling of uncertainty about it for I believe in it and praise it up where I can. Is not the fact that Cumberland county has a rival college within its borders, why the people are opposed to the State College? It is very natural that such should be the case. I am inclined to think

it may be. Perhaps there are more objections in that county than in any other. I should think there might be.

Mr. HUNTER, Franklin—I want to say just a word with regard to the remark made by Brother Vinton, that the farmers of Maine would vote that college out of existence. As far as my knowledge goes I don't believe it. I know in my section there are some people that speak in that way. I know if such a thing were attempted the farmers would arise in indignation, and it is growing in favor every year.

Pres. HARRIS, Orono—I think a good deal of misapprehension has come about by putting together these two words, agriculture, and college. We speak of the agricultural college very often without thinking that it is not agricultural at all, it is a college. We should lay the emphasis on the word college. An agricultural college ought not to differ from any other college except that it gives its attention to agriculture. We get the idea that an agricultural college is not unlike a commercial college, that the word is given to it simply to make it sound well. Now we must remember when we come to the farm of an agricultural college that it is put to an entirely different purpose than the farmer's farm. It is not used for agriculture it is used for education. Nothing that you use for education pays in any other sense. We don't ask our farm, when we use it for education to pay as a farm. It does not pay in beets and potatoes, but in boys and ideas. Almost always, if you make the farm pay in vegetables, it won't pay in ideas. It would be only teaching boys how to plow and plant potatoes. It is not worth while for us to teach that. It is unkind criticism when a man says the State farm don't pay as a farm. It is unfortunate, because it seems valid. The easiest way to make it pay would be to rent it out. We can't afford to pay a professor who is a teacher and make him run the farm. In fact everything on that farm does not pay to-day. The boarding house don't pay, the machine shop don't pay. Suppose we tried to make our boys build l comotives. They can't learn to make locomotives by helping build one locomotive. We must teach him to teach men to make locomotives. When he goes into the machine shop, the first step is to learn to file a smooth surface. The next step is to make another surface at right angles with the first—not, to make a good surface, but to make a good angle. He next files another at right angles to the second. And so on, step by step.

Take any other department you can mention, and it don't pay. That is the reason we have to have an appropriation. As to the professors making a living at farming, I don't know whether they could or not. I know there are plenty of good professors that would not make good farmers Men can manage boys when they can not manage dollars. It is a noted fact that the men who have run the United States Treasury are men who could never make their accounts balance. They could manage big things but not little things, because the two things are entirely different. I want to say that the general attitude of the Maine farmers toward the institute is not peculiar My own state, Pennsylvania, is a great agricultural state as well as a great manufacturing state. It has an agricultural college, magnificently equipped. This last year it did not get any students in agriculture. You ask them why, they don't know. You go into almost any state in the Union and something of the same condition of affairs obtains. In New York, they have Cornell with its magnificent equipment, and in Cornell the agricultural college is equipped as well as any college in the university. Most people would say it is bad business to put so much money in a department where there are so few students. I can say that there is but one thing for us to do and that is to keep at it, the farmer ought to be educated, if we can't do it one way, we must another. I believe it is the duty of this Board, and of every intelligent farmer in this State to stand by the college. There is nothing I am more anxious to hear than criticism. People are quite apt to give the President compliments, and tell somebody else what is the matter. There is nothing so hard to get as ideas that are practical. You give general criticisms. A man may come and tell you, you are not pleasant enough. How a man can make himself more pleasant is a big problem. If you will tell him some particular thing that makes him unpleasant it will be a benefit to him. I am not surprised that it is hard to get an appropriation for agriculture. Uncle Jerry Rusk said that he always tried to get on the agricultural committees, lawyers, doctors, and business men, and just as few farmers as he could, for they were not in favor of spending any money for themselves. The tendency of agricultural life is away from spending and toward saving. Most of the money made in agriculture is made by waiting and saving. I believe it is right, that we should find most of our best friends among men who who are not farmers, because the interest of the farmer is more

largely the interest of everybody than any other occupation. It has always seemed to me that the high wages in this country were to a considerable extent due to the fact that agriculture was to a large extent profitable. When manufacturing don't pay, the laborer must go back to agriculture, when manufacturing is profitable the laborers are turned from agriculture. It is the basis of the prosperity of every man in the State. I ardently hope that this Board and the intelligent farmers of the State, will see to it, that the college is sustained by the people so far as it is necessary. I hope that this Board will not be backward in criticising us, and we may be able to do something better for agriculture and for the State.

Mr. VINTON—A single word in regard to the difficulty which surrounds us. Now the agricultural press is supposed to be a great educator, and it is. The agricultural press takes two views of the State College. The *New England Farmer* says it should not be a distinctively agricultural college, but it should be a college with agriculture in it, the matter of agriculture should not be made prominent. Now the president has just enunciated in that line. He would have the college take that ground, that agriculture should not be made prominent in it We have one distinctly agricultural paper, the *Maine Farmer*. Now that takes directly the opposite ground, and about every issue of the *Maine Farmer* has punched the *New England Farmer* on that issue. Now the position of our leading agricultural journal is that it should be a distinctly agricultural college. When an appropriation is made, it should be for that purpose. Here is the Board of Agriculture between Scylla and Charybdis How shall we navigate our boat on the waters between the two and not be wrecked on either? I believe in making an agricultural college technical just so far as you can. There are some colleges that have had a considerable number of agricultural students. It has been heralded as a tremendous success for agriculture, as a matter of fact the most of the students came there because they were cheap schools, and you would be astonished to find how little agriculture there is taught in those schools, if you should happen to take up one of their catalogues Some agricultural colleges will make a great show of actual work. The boys raise things, they plow, and hoe, and do physical labor, which they do well enough on the farm. When you get down to science, and the study of the business, there is very little of it. Our college is not purely an agricultural college because it represents the mechanic

arts as well as agriculture. The grief of the thing is that we don't get students in our agricultural department.

Mr. PORTER, Aroostook —In my remarks before it seems as though I said something which caused the President to reply to it. I am very glad I said it. He has made us a very good speech and given us some instruction and some hints which were good, I sincerely thank him for the speech just made. When the people become better educated the barrier raised between the farmers and the State College will be broken down. They will realize the good of the State College. I don't think the farmers would vote this right out of existence, because there are lots of farmers that are proud of the State College, they are proud of the work that is being done there. They rejoice that it has been made possible for a poor boy to be educated cheaper than in any other school in the State. I know, in our section, we have had students who have come down there to be preceptors in our schools. I know there are objections to them, and one of our supervisors is prejudiced so strong that he would not hire the best students from the college. He could not see that any good could come from the Maine State College. Now he is an educated man. He is old, and it is not possible for him to loose his prejudice, but the old pass out of existence and a young class of people come in, they are looking toward progress and they accept the new and better way. The time will come when the State College will be a popular school and the whole State of Maine will stand by and back it up.

Dr. TWITCHELL—Mr. President, and Gentlemen of the Board: I have been deeply interested in the discussion as I was in the address of the President, and specially in the discussion of the whole Board as it seems to me it is striking at the very root of the trouble. It all hinges upon the one word education. There is a story of an old lady who put a cloth out to whiten on the grass and left it there for several days. She left it there over Sunday, and about the middle of the week she met her pastor and said, "That was a splendid sermon you preached Sunday." He said, "Let us see, what was the text?" "Really, I don't know," she said "Well," said he, "tell me some of the leading thoughts, and let us see how much good it did you." She waited a moment, and said, "I can't seem to think of anything in particular, but it did me lots of good." He said, "If you can't remember any of the leading thoughts or the text, how did it do you any good?" She said, "You see

that cloth on the grass, the sun and dew has been whitening it. I could not say just when or how it has been whitened, but it has been whitening all the same. That is the way with the sermon." So it is with the work of the Board and the work of the college. Now to my thought. I think I have said this before to the members of the Board. The work of the Board of Agriculture ought to strengthen the work of the college along agricultural lines. There must be a greater effort to bring the educational workers in contact with the people. If President Harris could go before the people of the State with his cordial manner, and speak to the people as he has spoken to the Board this morning, it would create a better feeling and do more good than tons of printed matter. I believe that that may be where the solution of the question is to be found. There is a complete justification for this Board to employ to the utmost, the teachers of the college, so that through direct contact they may exert their personal influence, and out of the combined work we shall begin to see the results for which we have labored all these years.

Mr. Atherton—I thank you for the honor of calling upon me and I will simply say I have been deeply interested in all the remarks that have been made. I am a farmer and have been all my life, and it would be wonderful indeed if I were not deeply interested in farming matters. I might honestly say that the longer I live the more deeply interested I am in farming I am in full sympathy with every farmer, not only in the grand old State of Maine, but throughout the country. I am in sympathy with this Board, and I can say I always have been. When it has been my privilege to attend a meeting of this Board I have availed myself of that privilege. I am happy to be here to-day. I can say I am in sympathy with the Board, and I feel my brother farmers, a large portion of them, are also in sympathy with the work of this Board, as I have been brought into contact with them in various sections of the State. I don't wish to say a word against what the member from Cumberland has said, but I was grieved to hear from him the remark he made that if a vote should be taken in his county the farmers would vote the college out of existence. Of course I am not in a position to judge of the truth or otherwise of such a statement, but it comes to me what I learned from a farmer I met the other day. I was on my way to Winthrop. I met a brother farmer. I said, "Good day, my friend,

you are riding the wrong way, you ought to be going to Winthrop to attend the Kennebec County Pomona Grange." He said, "I am not a granger." I said, "You ought to be." He said, "What good will it do me to belong to the grange?" I looked him in the face and said, "It would not do you one mite of good." He had the almighty dollar written on his face, and if he could not see beyond that, it would have done him no good to belong to the grange.

I am glad that this Board is in sympathy with the work of the college. I think it always has been. That is the position that in my judgment it should always take; to be in full sympathy with the work of the college it should be a laborer and not in any sense a director or dictator-general, but to aid it, because I have no doubt the President and the Professors could manage all the affairs of the college.

This State may be poor, compared with the great Empire state of New York or the great manufacturing state of Pennsylvania, but we are growing, and this State should not be niggardly in its appropriation and, gentlemen, it is for you to say how much shall be appropriated It may be for the legislature to say how much, but it is for you to use your influence in favor of the farmers, and associated dairying if in your judgment the State should take it up.

AFTERNOON MEETING.

Two reports presented by Committee on State Bounty.

Minority report presented by Mr. Richardson.

My reason for introducing this is that watching the work and the reports of the Secretary the last few years, I have noticed that there is more and more of the funds of the Society, the attention of the officers, and of the people, drawn to trotting pure and simple. I don't speak of horses as animals, their exhibit is aside, but of the mere trotting horse. It seems to me we are losing sight of the object for which agricultural societies were formed. The time will come when it will be impossible to induce any of the farmers of the State to bring out any of their products for the meager premiums offe ed. It will be a horse trot, pure and simple. It seems to me we are going fast in that direction. Let us compare for a few minutes how much of the money is going in that direction, proportionately. The report of the Secretary shows

that in round numbers trotting horses received last year $26,000 and their premiums amounted to $17,000. A little more than one-half of the entire receipts, the entire amount of money raised went to the act of trotting horses on the track. It was an act which depended quite as much on the jockey as on the horse. I don't know how much truth there is in it, but I have heard that these premiums are divided before the horses start, and all understand just which horses are to win. I have been told so a good many times. Is this kind of work the work of agricultural societies? That horses should be entered to trot, to show their endurance, etc., is a proper part of an agricultural fair, it encourages the raising of better horses. It brings in with it too much of the tricks of the trade, and unfair dealing, which is found in nearly all competitive exhibitions. The value of the horses reckoned at $100 apiece in round numbers would be $217,800, the value of neat stock $375,000. The neat stock only received in premiums $6,000, while trotting horses received $26,000. Is this right? It may be so, it is only a matter of judgment with me. Again the argument is, that it is absolutely necessary to draw a crowd, to get money to carry on the work. Well, there are other forms of amusements that may be brought in to draw a crowd, and we seem to be getting in that way Now over to Bangor they have pretty near up to a circus to draw a crowd. A lady rider on two horses is an important part of the exhibition, and it has come pretty near to a circus and not an exhibition of the speed, or endurance or value of our best horses. Neither are our best horses the ones that always win the money. I remember one instance of a horse that went on there and won the sweepstakes, and the next week sold for $10, that was more than it was worth. Is the money of the Society well invested, put out to worthless animals and unprincipled jockies I know there are honorable men and fine horses engaged in this business, but it is too apt to be the case that this class of men come in and occupy the attention of the public, and take the money of the Society. Whether or not they return enough even by drawing in the crowds that they do, is an open question Are men that go to horse trots the class of men that are interested in any way in agricultural matters? To be sure their quarter is worth just as much as the quarter which is received from other sources. If the Board has anything to do with the agricultural societies at all, it seems to be in this direction, and whether or not it is the duty of the Board

to act in this direction, it remains for the Board to say. If you let them alone in this respect, you must let them alone in all respects. The Board has no control of the Society in any other direction that I am aware of, except they can say in what direction one-half of the State stipend may be expended. I don't propose to take up your time but simply explain why I offered the motion I did yesterday to raise a committee of inquiry. I find I was in a minority on the committee and wished I had left it out entirely. As I was in it I thought I would make this explanation.

Mr. MOORS, Kennebec—I understand Mr. Richardson that one-half of the stipend of the State is to be paid on the same basis. It is now divided up among all the exhibits. It does not affect us at all. This one-half goes to the three things he has mentioned. I must say that on general principles I agree with Mr. Richardson. I don't know as I should entirely be in favor of placing one-half on these three things he has mentioned, I should rather put it on all of the exhibits outside of trotting horses. However, I would not quarrel about that. I think this is an important matter, we are drifting as Mr. Richardson says, into trotting fairs, drifting away from the agricultural society as they were intended to be, into a trotting society. Now this is the proposition I would make. Trotting is a benefit to agriculture or it is not, one or the other. If trotting horses, simply the act of trotting, is going to benefit agriculture why not give this stipend from the State to all our trotting societies? Why have they not the same right! On the other hand, if it is not a benefit to agriculture to pay this stipend toward trotting, then no one should have it, it should be taken away altogether. I think we are drifting away from the main purpose. One case I think of at present. A society was lately organized in my county. The purpose in organizing that society, it is a stock company, the real purpose was and is to pay dividends to these stockholders, to advance the interest of the stockholders, in fact the stockholders have no more interest in agriculture than I have in the manufacture of shingle nails. The organization is gotten up to put money into the pockets of the stockholders, they tack on the word agriculture to back the organization as an agricultural society. This last year they paid I think $600 in trotting prizes and something less than $200 for all other purposes outside of trotting, and a portion of that went for the bicycle races. A man recently told me that $90 would more than pay the entire premiums

which have been paid for agricultural purposes. That is where we are drifting. I think it is time this Board should take some definite action. We are getting worse and worse every year. It is considered, I think, by most of the officers of most societies that they can not run an agricultural society successfully unless they have horse trotting. In other words, it is the trot that brings in the dollars. They get the dollars to pay these premiums from the trotting horses. In fact, the horse men themselves pay a large part of the prizes. We have of the entrance fees five per cent, which amounts to about forty per cent of all the prizes for the last five or six years. We get about forty per cent out of the horse men themselves. It is a practice, I believe, in this country, from the general government down to the state, where there is aid given, to give it when it is needed. Where there is a weak spot, strengthen that weak spot. Now if it is the way I think it is, every one will admit there is a profit in having a horse trot; does that need any aid? Isn't it able to stand on its own bottom, without any aid from the State? On the other hand, there is an expense. We say we cannot—I don't think we can—run a simple agricultural fair without a horse trot. The other part, the agricultural part, does not pay its expenses, therefore that part needs aid from the State. That is where it is needed. If we are furnished a certain number of dollars to pay out in this way, why should we not pay it where it is needed, and not where it is not needed? If we had only our original society it would be a different thing, but we are going away from that idea altogether Therefore I think we ought to turn over a new leaf, for this Board has in truth, enough to do to advance the interest of agriculture, and lend aid where it is needed instead of where it is not needed. I think we should take some action on this, and start out in a new direction from what we are going now.

Mr. HUNTER, Franklin—Mr. President, I feel that I am in somewhat embarrassing position here to-day for this fact, that owing to sickness in Mr. McKeen's family he did not write to me until six days before this meeting asking me to prepare a paper for this meeting Three working days before the meeting I received the letter and my business was such that it was impossible for me to give it any attention. I did not offer to do any work of any account until half past nine on Monday so you see I had very little time to make any preparations for this paper. I am very sorry that I

could not have had sufficient notice, I should have been glad to say something about these abandoned farms. I have a great deal of interest in that direction, I know something of it. I don't feel that Brother McKeen is in any way in fault in not writing to me, I don't think any one is to blame for it whatever. How he happened to write to me in relation to this affair, he has received letters inquiring about our abandoned farms. Some object to that name, one man put it abandoned homes. The fact exists, that we have lots of abandoned homes here in Maine. What shall be done about it is now before us under discussion. I may say I replied to these letters which Mr. McKeen sent me or all but one and that was so broad that I could not seem to make any reply. I received replies from nearly every one. Quite a number of them were from would-be-purchasers. One I received from a man who was in pursuit of a home, a summer home. I had written to him in regard to a farm I described to him a farm not far from my place that would make a splendid summer home. I did not know what he was driving at. I wrote in several directions they might take it as they pleased. One man regretted very much that he did not receive my letter sooner as he had just contracted for a summer home on the coast. He evidently, from his writing, would have been glad to go near the Rangeley lakes. There are a number of these places that are practically abandoned homes, which would make fine places for people who come from cities, for summer homes. I think considerable numbers are already being taken up. It is a fact that there is quite an inquiry for a catalogue of these farms. That is what Mr. McKeen requested me to speak of here to-day, the desirability of cataloguing these farms. It seems to me it is necessary and desirable to have a catalogue of these farms. I have received quantities of reading matter asking me for a catalogue of these farms. Not having any catalogue of course I had to write them the best I could. Massachusetts has, I think, a catalogue of her farms on sale, not all abandoned, I think, and New Hampshire I think has done a great deal of work in that direction. They have got a great many people from the cities, a great many people who wanted summer homes and a great many who wanted farms on which to make a living. I think there has been some of these farms sold in Maine. Three in my own vicinity which I thought were beyond hope. At the cheap price of these farms any man who is in the neighborhood can buy them, cut off

the hay and haul it home, gather the apples, and tear down some of the buildings and carry them home and make a good thing of it. I don't know as that is good for the State of Maine, it is not building up the State of Maine, it is not building up our school district.

I think I will leave this matter here. Brother McKeen can tell you more about it than I can. As I understand it, it will not cost us anything in particular. The printing will come from the appropriation of the State. It will make, I judge, some little trouble to the Secretary or somebody, but I think it will be a great advantage to our State.

*Ques.* What about the expense?

*Ans.* As I understand it, the printing will be about all the expense there is to it. That comes out of the State appropriation for printing. There will be a lot of postage, I don't know of anything else.

*Ques.* How will the Secretary get the farms to be catalogued?

*Ans.* He might advertise. He could get it through the different agricultural societies. I am sure if it can be known that the Secretary will catalogue these farms that are for sale, he will have quite a little catalogue right away. No doubt of it at all. Many farms on which old men are now living. They are for sale, if they can sell them. The trouble is, there are no purchasers in their vicinity and people outside don't know anything about it. They will send a description of their farms.

*Rem.* I don't think it would do to take every man's statement about his farm.

Mr GILMAN, Piscataquis—This was before our committee and we gave the matter some attention, and we could see only one way in which a proper catalogue could be obtained, and that was that each member of the Board from his county should see the various town assessors and from them he could learn of the abandoned farms, their condition, why they were abandoned, whether they were for agricultural purposes or summer homes. It was a matter in which we had no power to act. The Secretary showed us a list of some states, where they had catalogued the farms. Both Mr. Adams and myself became largely interested in it, and as we have no votes, when it wants the expression of the Board whether this work should be done or not, it was thought best that we should simply report this to you, and Mr. Adams some time ago had made arrangements to be here and speak in relation to this matter. As

he is not here I have said what I have in relation to the matter. If I was able and in condition to talk I should beg lief from the chair to say what I know, and what inquiries I have made, and what benefit I am positive would be derived by the State if these farms could be fairly catalogued and then placed before the community at large.

Mr. BALENTINE, Orono—It seems to me if this work is to be done a careful distinction will have to be made in the catalogue between those farms that are really fit for agricultural purposes and those that would do for summer homes and are not fit for agricultural purposes. We know that many of our abandoned farms are farms abandoned because they are so hard to work. We don't want to give any impression to the investigators of this subject in other states, or our own State, that farms of this character are on the market, and give them the impression that they are fit for agricultural purposes. That they ought to be occupied at all for just what can be gotten off from them. For I may state that many of them would be of a character that would not enable the purchaser to get a living off from them. This work should be done very carefully if the Board of Agriculture assumes any responsibility for the catalogue. I think that those farms that are fit for agricultural purposes, fit for tillage, should be catalogued separate from those that have buildings on them that would be suitable for summer homes, for families to come down and spend the long months of summer, and for no other purpose. That would bring perhaps a class of people into the State that would bring money and be a benefit to the community and offer a better market for the produce of the community.

Secretary MCKEEN—The cataloguing of abandoned farms has been a success in New Hampshire, Vermont and Massachusetts, in bringing purchasers, quite a good many in Massachusetts and Vermont.

It requires a good deal of labor on the part of some one, something I do not desire except as a work of agriculture for the benefit of the State. My purpose was to bring it before the members of the Board for their action. What the result may be in this State we can only judge from what the result has been in the other New England states that have adopted this plan.

Mr VINTON—Massachusetts has spent a good deal of labor and effort in this direction. I have never been able from any inquiries I have made to find out what it is done for. I don't know now. It

has raised a great deal of criticism as to whether it was wise or not. If it be an act to sell the farms that are for sale that is one thing, but is it wise to catalogue and proclaim to the world property that is abandoned. Hadn't we better use some other word? We catalogue what is abandoned and we want somebody to come and take something that somebody else has abandoned for some cause. The truth is a large portion of our farm land ought to be abandoned. Some are abandoned because the children have gone away and the old folks have died and there is nobody there. It seems to me if we want to catalogue and inform people of other states or people of our own State that we have these farms for sale do so, but don't let us call them abandoned. I submit if we are going to try to get purchasers for our farms to proclaim in advance that they are abandoned is a strange way of advertising. Another objection in my mind is it singles out the occupation of the farmer and undertakes to proclaim to the world the agriculture of the State is a failure to the extent of a large portion being abandoned. There is an invidious comparison there. Other properties are abandoned, factories are abandoned.

# Statistical Tables of Agricultural Societies.

# OFFICERS OF AGRICULTURAL SOCIETIES.

| Name of Society. | President. | Post Office. | Secretary. | Post Office. | Treasurer. | Post Office. |
|---|---|---|---|---|---|---|
| Maine State Agricultural Society | S. G. Jerrard | Kenduskeag | G. M. Twitchell | Augusta | E. G. Eveleth | Auburn. |
| Eastern Maine Fair Association | J. P. Bass | Bangor | E. L. Stearns | Bangor | E. B. Nealey | Bangor. |
| Maine State Pomological | Chas. S. Pope | Manchester | D. H. Knowlton | Farmington | C. E. Wheeler | Chesterville. |
| Androscoggin County | David P. Field | Auburn | James L. Lowell. | Auburn | Joseph G. Ham | Livermore Falls. |
| Aroostook County | S. W. Porter | Houlton | A. O. Jones | Houlton | Geo. H. Gilman | Houlton. |
| Aroostook, North | Cyrus Chase | Westfield | R. J. Smith | Presque Isle | S. W. Duff | Presque Isle. |
| Cumberland County | Warren H. Vinton | Gray | Benj. F. Whitney. | Gorham | Fred D. Scammon | Gorham. |
| Cumberland, North | Richard Cook | Edes Falls | A. Moulton | Harrison | Joseph Pitts | Edes Falls. |
| Cumberland Farmers' Club | C. A. Merrill | Cumberland Cen. | M. W. Pearson | Cumberland Cen. | N. M. Shaw | W. Cumberland. |
| Cumberland, Gray Park Association | Wm. P. Haskell | Gray | J. W. Stevens | Gray | J. W. Stevens | Gray. |
| Cumberland, Bridgton Farmers'Club | Samuel S. Fuller. | Bridgton | Isaiah S. Webb | Bridgton | Isaiah S. Webb | Bridgton. |
| Franklin County | Russell S. Currier | East Wilton | Reuben Hatch | Farmington | Chas. F. Smith | Farmington. |
| Franklin, North | T. B. Hunter | Strong | J. W. Butterfield. | Phillips | E. A. Peary. | Phillips. |
| Hancock County Agricultural | F. P. Merrill | Bluehill | Nahum Hinckley. | Bluehill | M. P. Hinckley | Bluehill. |
| Hancock County Fair Association | A. W. Ellis | Ellsworth | H. F. Whitcomb | Ellsworth | H. J. Joy | Ellsworth. |
| Kennebec County | R. H. Jacobs | Mt. Vernon | Geo. E. Coleman. | Readfield | Wm. A. Lord | Readfield. |
| Kennebec, Pittston Trot'g Park As'n | A. E. Marson | East Pittston | G. R. Mansir | East Pittston | H. A. Clark | East Pittston. |
| Kennebec, South | David Given | South Windsor | F. H. Mooers | Pittston | Jasper S. Gray | South Windsor. |
| Knox, North | E. H. Mero | Union | F. E. Burkett | Union | B. Burton | Union. |
| Lincoln County | John M. Glidden. | Newcastle | E. E. Dunbar | Damariscotta | F. L. Carney | Sheepscot. |
| Oxford County | J. A. Roberts | Norway. | A. C. T. King | South Paris | A. C. T. King | South Paris. |
| Oxford, Riverside Agricultural | C. M. Wormell | Bethel | E. M. Walker | Bethel | E. M. Walker | Bethel. |
| Oxford, West | M. M. Smart | Fryeburg Center. | C. H. Walker | Fryeburg | W. R. Tarbox | Fryeburg. |
| Oxford, Androscoggin Valley | T. B. W. Stetson | Canton | H. T. Tirrell | Canton | D. W. Goding | East Peru. |
| Oxford, North | Geo. O. Huse | Andover | S. F. Talbot | Andover | S. F. Talbot | Andover. |
| Penobscot, West | John Rogers | Stetson | T. P. Batchelder. | Kenduskeag | T. P. Batchelder | Kenduskeag. |
| Penobscot, North | Edwin A. Reed | North Lee | L. W. Trask | Springfield | A. H. Lindsay | Carroll. |
| Penobscot and Aroostook | John Burnham | Sherman Mills | L. B. Rogers | Patten | R. D. Gardner | Patten. |
| Piscataquis, East | Ira F. Hobbs | Milo | W. H. Snow | Milo | W. H. Snow | Milo. |
| Piscataquis, Central | Thomas Daggett. | Foxcroft | W. W. Dunham | Foxcroft | W. W. Dunham | Foxcroft. |
| Piscataquis, West | W. F. Towne | Monson | E. R. Haynes | Monson | E. R. Haynes | Monson. |

| | | | | | | |
|---|---|---|---|---|---|---|
| Sagadahoc County | Edwin Totman | Richmond | W. S. Rogers | Topsham | L. E. Smith | Brunswick. |
| Somerset, East | P. W. Thompson. | Hartland | S. F. Goodwin | St. Albans | S. L. Mayo | Hartland. |
| Waldo County | James Ellis | Brooks | G. G. Abbott | Belfast | A. S. Redman | Belfast. |
| Waldo and Penobscot | M. C. Chapman | Newburg Village | E. H Nealley | Monroe | F. L. Palmer | Monroe. |
| Waldo, North | Jesse Smart | West Troy | J. H. Cook | Unity | Edwin Hunt | Unity. |
| Waldo, West | L. C. Morse | Liberty. | W. H. Moody | Liberty | S. T. Young | Liberty. |
| Washington County | Geo. W. Allan | West Pembroke | H. F. Porter | Pembroke | N. S. Allan | Dennysville. |
| Washington, West | Jas. L. Bucknam, | Columbia Falls | E. F. Allen | Columbia Falls | F. L. Allen | Columbia Falls. |
| Washington, Central | John K. Ames | Machias | W. H. Phinney | Machias | M. Gardner | Machias. |
| Washington, North. | Oscar Pike | Princeton | Willis R. Dresser. | Princeton | S. G. Spooner | Princeton. |
| York County | E. W. Staples | Biddeford | S. S. Andrews | Biddeford | G. H. Boothby | Saco. |
| York, Buxton and Hollis | A. L. Berry | Bar Mills | Daniel J. Fobey | Hollis | Jas. W. Meserve | Bar Mills. |
| York, Ossipee Valley | Howard Brackett | Cornish | James C. Ayer | Cornish | Walter P. Perkins | Cornish. |
| York, Ramshackle Park | C. A. Goodwin | Woodman, N. H. | L. O. Straw | Newfield | C. E. Pinkham | West Newfield. |
| York, Shapleigh and Acton | H. J. Credeford | Shapleigh | Horace Bodwell | Acton | H. A. Stanley | Shapleigh. |
| York, Sanford Agricul. and Mechan. | J. H. Maker | Springvale | A. W. Low | Springvale | I. A. Butler | Springvale. |

# FINANCIAL STATEMENT OF AGRICULTURAL SOCIETIES FOR 1893.

| Societies. | Amount received from State, 1893. | Amount received from State, 1894. | Receipts from membership. | Receipts from loans. | Receipts from entry fees. | Receipts from all other sources. | Total receipts. | Expended in improvements. | General expenses. | Total amount paid out. | Value of property belonging to society. | Amount of liabilities. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Androscoggin County | $345 63 | $284 73 | $183 00 | - | $541 20 | $1,344 99 | $2,444 82 | $93 60 | $382 82 | $2,226 06 | $1,000 00 | $1,041 55 |
| Aroostook County | 150 07 | 141 21 | 41 00 | - | 194 00 | 479 20 | 764 27 | 15 65 | 162 63 | 1,074 33 | 380 00 | 458 00 |
| Aroostook, North | 191 02 | 176 98 | 35 00 | - | 235 50 | 1,172 35 | 1,442 85 | 223 46 | 362 58 | 1,709 04 | 2,500 00 | 900 00 |
| Cumberland County | 482 02 | 389 78 | - | $1,357 07 | 570 75 | 4,821 69 | 7,241 53 | 1,598 47 | 1,935 72 | 7,187 10 | 6,000 00 | 1,357 07 |
| Cumberland, North | 155 57 | 116 50 | 233 41 | - | 204 00 | 558 50 | 1,151 48 | 251 16 | 165 86 | 1,127 27 | 1,800 00 | 20 00 |
| Cumberland Farmers' Club | - | 145 59 | 8 00 | 50 00 | 306 25 | 1,142 42 | 1,506 67 | - | - | 1,481 78 | 3,215 50 | 522 00 |
| Cumberland, Gray Park Ass'n, | - | 195 29 | - | - | 388 25 | 1,804 16 | 2,192 41 | 172 82 | 213 11 | 1,625 13 | 7,000 00 | 1,500 00 |
| Cumberland, Bridgton Farm'rs' Club | - | 21 14 | - | - | - | 428 25 | 428 25 | - | - | 232 20 | 475 00 | |
| Franklin County | 207 56 | 202 76 | 658 00 | - | 265 00 | - | 2,450 52 | 300 00 | - | 2,226 12 | 10,000 00 | 590 40 |
| Franklin, North | 149 57 | 89 20 | 225 00 | 1,950 00 | 117 50 | 819 89 | 3,110 39 | 77 00 | 50 00 | 3,110 39 | 2,500 00 | 2,172 95 |
| Hancock County Agricultural | 224 22 | 133 38 | - | - | 161 50 | 806 80 | 1,192 52 | - | 360 50 | 1,206 35 | 4,000 00 | 1,000 00 |
| Hancock County Fair Ass'n | 228 86 | 260 15 | - | - | 501 50 | 3,684 22 | 4,414 58 | 775 72 | 1,240 84 | 3,971 81 | 11,154 24 | |
| Kennebec County | 221 71 | 189 41 | - | - | 281 00 | 1,442 07 | 1,944 78 | 222 38 | 521 26 | 2,002 64 | 1,800 00 | 275 00 |
| Kennebec, Pittston Trotting Park Association | - | 112 33 | 15 00 | - | 160 45 | 509 25 | 684 70 | - | 73 25 | 787 05 | 1,500 00 | 500 00 |
| Kennebec, South | 71 59 | 89 66 | - | - | 126 75 | 1,260 08 | 1,458 42 | 157 72 | 1,272 57 | 1,433 84 | 1,300 00 | |
| Knox, North | 46 25 | 72 96 | 278 50 | 1 50 | 10 50 | 435 50 | 772 25 | 10 00 | 349 25 | 822 25 | 25 00 | 50 00 |
| Lincoln County | 129 95 | 47 43 | 19 00 | 450 00 | 73 00 | 445 68 | 1,117 63 | 350 00 | 748 60 | 1,098 60 | 2,000 00 | 800 00 |
| Oxford County | 341 35 | 360 32 | 26 00 | - | 432 50 | 3,776 15 | 4,676 00 | - | 804 09 | 4,200 80 | 10,000 00 | 2,060 00 |
| Oxford, Riverside Agricultural, | - | 161 84 | - | - | 308 75 | 1,075 30 | 1,384 05 | 144 27 | 269 98 | 1,441 17 | 2,128 62 | 560 73 |
| Oxford, West | 221 63 | 198 18 | 72 00 | - | 342 85 | 1,562 79 | 2,199 27 | 350 00 | 465 00 | 2,072 55 | - | 1,500 00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oxford, Androscoggin Valley.. | 221 32 | 218 31 | 7 00 | - | 324 00 | 1,345 89 | 1,895 21 | 100 00 | 575 62 | 2,060 87 | 1,800 00 | 2,245 00 |
| Oxford, North .. | 75 98 | 96 23 | 10 00 | - | 132 50 | 6 40 | 1,494 85 | 456 30 | - | 1,382 18 | 2,250 00 | |
| Penobscot, West | 414 18 | 162 46 | 70 00 | - | 725 00 | 3 40 | 2,483 81 | 716 74 | 1,984 22 | 2,700 96 | 2,000 00 | |
| Penobscot. North | 125 04 | 118 13 | 6 00 | - | 143 75 | 45 50 | 320 29 | 15 00 | 54 45 | 819 05 | 25 00 | 498 76 |
| Penobscot and Aroostook | 100 00 | 100 00 | 11 00 | 56 23 | 144 00 | 511 11 | 822 34 | 73 60 | 100 00 | 674 39 | 2,000 00 | 2,147 61 |
| Piscataquis, East | 5 15 | 54 25 | 13 00 | - | 116 50 | 224 60 | 357 60 | - | 15 00 | 359 60 | | |
| Piscataquis, Central | 70 18 | 85 93 | 107 00 | - | 151 85 | 328 00 | 657 03 | | | | | |
| Piscataquis, West.. | 13 68 | 11 89 | 45 50 | - | - | 56 70 | 115 88 | - | 30 08 | 105 58 | - | 22 17 |
| Sagadahoc County | 390 74 | 391 65 | 3,723 86 | 200 00 | 791 50 | 202 55 | 5,405 90 | 241 14 | 1,355 96 | 4,082 22 | 5,000 00 | 84 56 |
| Somerset, East | 97 61 | 156 92 | 27 00 | - | 378 00 | 678 51 | 1,181 12 | - | 145 73 | 1,150 02 | 4,700 00 | 2,070 71 |
| Waldo County | 87 24 | 110 12 | 10 00 | - | 95 10 | 301 91 | 493 25 | 25 00 | 60 00 | 783 75 | 3,590 00 | |
| Waldo and Penobscot | 250 00 | 250 00 | - | 5 20 | 563 80 | 2,151 54 | 2,970 54 | 189 29 | 2,153 82 | 2,343 11 | 3,500 00 | |
| Waldo, North | 102 78 | 113 31 | 20 00 | - | 114 00 | 626 17 | 862 95 | 100 00 | 78 67 | 887 67 | | |
| Waldo, West | 82 06 | 95 58 | - | - | 276 00 | 312 37 | 670 43 | 336 00 | 71 00 | 1,013 59 | 1,200 00 | |
| Washington County | 161 56 | 127 17 | - | 15 68 | 159 00 | 910 30 | 1,246 54 | - | 536 26 | 1,345 21 | 1,800 00 | |
| Washington, West | 333 06 | 343 33 | 1 00 | - | 240 00 | 2,678 05 | 3,222 11 | - | 985 43 | 3,163 93 | 1,682 63 | |
| Washington, Central | 228 02 | 67 10 | - | - | 86 00 | 682 59 | 996 61 | - | 589 41 | 996 61 | - | 916 58 |
| Washington, North | 163 59 | 136 71 | - | 335 00 | 177 00 | 790 91 | 1,466 50 | 335 00 | 252 00 | 1,466 50 | | |
| York County | 263 00 | 306 78 | 5 00 | 650 00 | 586 50 | 2,348 21 | 3,852 71 | 666 12 | 1,196 21 | 3,808 99 | 2,000 00 | 950 00 |
| York, Buxton and Hollis | 200 00 | 200 00 | 40 00 | 350 33 | 649 00 | 2,278 91 | 3,518 24 | 1,300 00 | 624 03 | 3,557 93 | 3,800 00 | 1,700 30 |
| York, Ossipee Valley | 141 26 | 138 83 | 19 00 | - | 325 00 | 931 24 | 1,416 50 | 331 70 | 306 86 | 1,416 50 | 6,000 00 | 1,260 41 |
| York, Ramshackle Park | 111 15 | 112 06 | 10 00 | - | 169 50 | 586 75 | 877 40 | 50 00 | 84 25 | 845 32 | 4,500 00 | |
| York, Shapleigh and Acton | 158 83 | 196 42 | 204 00 | 100 00 | 287 00 | 849 40 | 1,600 00 | - | - | 1,246 37 | 4,360 00 | |
| York, Sanford Agr. & Mechan . | 186 93 | 170 34 | - | - | 171 25 | 1,074 75 | 1,432 93 | 65 75 | 400 00 | 1,566 60 | 5,000 00 | 320 60 |

## Financial Statement of Agricultural Societies—Continued.

| Societies. | Amount awarded trotting bred stallions. | Amount awarded trotting bred brood mares. | Amount awarded draft stallions. | Amount awarded draft brood mares. | Amount awarded family horses. | Amount awarded gents' drivers. | Amount awarded matched horses. | Amount awarded horses for all work. | Amount awarded colts. | Amount awarded horses for draft. | Amount awarded in trotting purses. | Total awards to horses. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Androscoggin County | $33 00 | $9 00 | $ 6 00 | - | $9 00 | $10 00 | $12 00 | $8 00 | $35 00 | $14 00 | $1,179 25 | $1,315 25 |
| Aroostook County | 3 00 | 4 50 | 10 00 | $3 50 | 4 50 | 4 50 | 6 00 | - | 10 00 | 6 00 | 600 00 | 652 50 |
| Aroostook, North | - | 3 00 | 3 00 | 6 00 | - | 3 00 | 3 00 | 6 75 | 16 50 | 6 00 | 877 50 | 924 75 |
| Cumberland County | 29 00 | 17 00 | - | 17 00 | - | 5 00 | - | - | 35 00 | 30 00 | 1,749 50 | 1,885 50 |
| Cumberland, North | 3 00 | 3 00 | - | 3 00 | 3 00 | - | - | 3 00 | - | 25 00 | 485 00 | 525 00 |
| Cumberland Farmers' Club | 7 00 | - | - | 2 00 | - | 10 00 | 10 00 | 5 00 | 11 00 | - | 675 00 | 720 00 |
| Cumberland, Gray Park Association | 14 00 | 5 00 | - | 5 00 | 5 00 | 15 00 | 5 00 | - | 21 00 | - | 855 00 | 925 00 |
| Cumberland, Bridgton Farmers' Club, | - | - | - | - | - | - | - | - | - | 21 00 | | |
| Franklin County | - | - | 5 00 | 3 00 | - | 6 00 | 5 50 | - | 22 50 | 3 50 | 703 25 | 748 75 |
| Franklin, North | - | - | 2 50 | 6 50 | - | 3 50 | 3 50 | - | 11 40 | - | 400 00 | 427 40 |
| Hancock County Agricultural | 8 00 | 9 00 | - | - | - | - | - | - | 36 00 | - | 580 00 | 633 00 |
| Hancock County Fair Association | 29 50 | 9 00 | 14 00 | 9 00 | - | - | 5 00 | - | 29 00 | - | 1,100 00 | 1,195 50 |
| Kennebec County | 6 00 | 6 00 | - | 3 00 | 9 00 | 10 00 | 5 00 | - | 21 50 | 12 00 | 680 00 | 752 50 |
| Kennebec, Pittston Trot'g Park Ass'n, | 3 00 | 3 00 | - | - | - | - | - | - | 4 00 | - | 601 00 | 611 00 |
| Kennebec, South | 11 25 | 4 40 | - | - | 2 25 | 6 15 | - | 3 50 | 3 50 | 6 75 | 315 00 | 354 60 |
| Knox, North | 9 00 | 11 00 | 3 00 | 9 00 | 6 00 | 5 00 | - | 11 00 | 31 00 | 7 00 | 140 00 | 232 00 |
| Lincoln County | 8 00 | 2 50 | - | - | 1 00 | - | - | - | 4 50 | - | 195 00 | 211 00 |
| Oxford County | 61 00 | 27 00 | - | - | - | 35 00 | - | - | 54 00 | 59 00 | 1,140 00 | 1,394 00 |
| Oxford, Riverside Agricultural | 5 00 | 3 50 | - | - | - | 25 00 | - | - | - | 38 00 | 750 00 | 821 50 |
| Oxford, West | - | 6 00 | - | - | 5 00 | 25 00 | - | - | 31 00 | 15 00 | 787 50 | 871 50 |
| Oxford, Androscoggin Valley | 26 00 | 17 00 | - | - | - | 25 00 | 8 00 | - | 31 00 | - | 869 75 | 976 75 |
| Oxford, North | 6 00 | 3 00 | - | - | - | - | - | 7 20 | - | 20 00 | 395 00 | 431 20 |
| Penobscot, West | 14 00 | - | - | 5 00 | - | 10 00 | 5 00 | 22 00 | 27 00 | 8 00 | 490 00 | 581 00 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Penobscot, North | - | 6 00 | - | - | - | 5 00 | - | 10 00 | 23 75 | - | 534 25 | 579 90 |
| Penobscot and Aroostook | 5 00 | 5 00 | 5 00 | 5 00 | 2 00 | - | - | - | 13 25 | 10 00 | 395 50 | 440 75 |
| Piscataquis, East | 3 00 | 3 00 | 3 00 | 2 00 | 1 50 | - | 2 00 | - | 3 25 | 13 00 | 287 00 | 317 75 |
| Piscataquis, Central | 10 00 | 6 00 | 4 00 | 3 00 | 3 00 | 3 00 | 5 00 | - | 10 50 | 10 00 | 375 00 | 429 50 |
| Piscataquis, West | - | - | 3 00 | 2 75 | 1 50 | - | 2 50 | - | 9 00 | 29 00 | - | 47 75 |
| Sagadahoc County | 21 00 | 7 00 | - | - | - | 15 00 | - | 8 00 | 23 00 | - | 1,375 00 | 1,449 00 |
| Somerset, East | - | 6 50 | - | - | - | 3 25 | 4 25 | - | 21 00 | 9 00 | 604 46 | 648 46 |
| Waldo County | 5 00 | 4 50 | - | - | - | - | - | - | 16 00 | 5 00 | 425 00 | 455 50 |
| Waldo and Penobscot | 23 00 | 6 00 | 12 00 | 6 00 | 10 00 | 10 00 | 8 00 | 11 00 | 35 00 | 36 00 | 1,067 50 | 1,164 50 |
| Waldo, North | 13 00 | 6 00 | - | 6 00 | 6 00 | 6 00 | 6 00 | 6 00 | 15 00 | 6 00 | 377 00 | 447 00 |
| Waldo, West | 11 00 | 10 00 | - | - | - | - | - | - | 20 00 | 10 00 | 510 00 | 561 00 |
| Washington County | 7 00 | 12 00 | 7 00 | 12 00 | - | - | - | - | 42 00 | - | 380 00 | 460 00 |
| Washington, West | 45 00 | 12 00 | 20 00 | 12 00 | - | - | 5 00 | - | 62 00 | 48 00 | 680 00 | 884 00 |
| Washington, Central | 16 00 | 8 00 | 16 00 | 8 00 | - | 2 00 | - | 2 00 | 23 00 | 5 00 | 344 00 | 424 00 |
| Washington, North | 5 00 | 6 00 | 5 00 | 6 00 | - | - | 3 00 | - | 22 00 | 25 00 | 506 50 | 573 50 |
| York County | 15 00 | 8 00 | - | - | - | 6 00 | 8 00 | - | 14 00 | 26 00 | 1,551 25 | 1,628 25 |
| York, Buxton and Hollis | 5 00 | 14 00 | - | - | - | - | - | 3 00 | 6 00 | 8 00 | 700 00 | 736 00 |
| York, Ossipee Valley | 16 00 | 10 00 | - | - | 5 00 | 5 00 | - | - | 21 00 | - | 1,358 50 | 1,415 50 |
| York, Ramshackle Park | 16 00 | 6 00 | - | - | 6 00 | 10 00 | 6 00 | 6 00 | 21 50 | 6 00 | 625 00 | 702 50 |
| York, Shapleigh and Acton | 3 00 | 3 00 | - | 3 00 | 3 50 | 13 00 | - | - | 7 75 | - | 645 87 | 679 12 |
| York, Sanford Agricultural and Mech. | 8 00 | 11 00 | - | - | 7 00 | 7 00 | 10 00 | - | 18 00 | - | 616 25 | 677 25 |

## Financial Statement of Agricultural Societies—Continued.

| Societies. | Amount awarded thoroughbred bulls. | Amount awarded thoroughbred cows. | Amount awarded grade bulls. | Amount awarded grade cows. | Amount awarded herds. | Amount awarded oxen and steers. | Amount awarded matched oxen and steers. | Amount awarded trained steers. | Amount awarded beef cattle. | Amount awarded town teams. | Amount awarded oxen and steers for draft. | Amount awarded sheep. | Total awards on neat stock. | Amount awarded swine. | Amount awarded poultry. | Total awards on live stock. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Androscoggin County | $20 00 | $43 00 | $6 00 | $39 00 | $20 00 | $5 00 | 18 00 | 16 00 | 8 00 | 16 00 | 70 00 | 24 00 | $261 00 | – | $28 00 | $421 00 |
| Aroostook County | 12 00 | 34 00 | 3 00 | 18 75 | 4 00 | 2 50 | – | – | – | – | – | 42 75 | 117 00 | $13 00 | 48 25 | 178 25 |
| Aroostook, North | 2 00 | 3 00 | 2 25 | 16 75 | 11 00 | 2 00 | | | | | | 11 50 | – | 3 00 | – | 98 75 |
| Cumberland County | 50 00 | 90 00 | – | 37 00 | 32 00 | 55 00 | 28 00 | 5 00 | 10 00 | 26 00 | 149 00 | 41 00 | 2,498 50 | 8 00 | 67 00 | 2,478 50 |
| Cumberland, North | 2 00 | 11 00 | – | 3 00 | 10 00 | 5 00 | 13 00 | 5 00 | 6 00 | 10 00 | 38 00 | 7 00 | 110 00 | 11 50 | 9 50 | 616 00 |
| Cumberland Farmers' Club | 2 00 | 7 00 | – | 9 50 | 9 00 | 14 00 | 10 00 | – | 10 00 | 28 00 | 22 00 | – | 111 50 | – | 5 60 | 837 10 |
| Cumberland, Gray Park Association | 6 00 | 19 00 | 3 50 | 21 50 | 13 00 | 7 00 | 11 00 | – | 7 00 | 20 00 | 75 00 | 8 00 | 191 00 | – | 18 75 | 279 75 |
| Cumberland, Bridgton Farmers' Club | – | – | – | 14 50 | – | – | 26 00 | – | 3 00 | 8 00 | – | 3 00 | – | 2 00 | 1 00 | 43 00 |
| Franklin County | 35 00 | 54 75 | 14 25 | 28 00 | 25 00 | 8 00 | 51 50 | – | 7 00 | 72 00 | 20 00 | 85 00 | 400 50 | 8 50 | 22 40 | 476 90 |
| Franklin, North | 11 25 | 8 90 | 4 25 | 4 65 | 5 00 | 3 00 | 8 50 | – | 8 00 | 20 90 | 3 50 | 13 00 | 90 95 | 1 00 | 4 20 | 96 15 |
| Hancock County Agricultural | – | – | 9 00 | 36 00 | – | 13 00 | 7 00 | – | – | – | 10 00 | 7 00 | 83 80 | – | 5 50 | 722 30 |
| Hancock County Fair Association | – | 18 00 | 15 00 | 25 70 | – | 16 80 | – | 4 00 | – | – | 14 00 | 5 50 | 99 00 | 6 00 | 1 00 | 201 50 |
| Kennebec County | 17 50 | 45 00 | – | 25 50 | 23 00 | 29 50 | 15 00 | 5 00 | 5 50 | 45 06 | – | 21 50 | 232 50 | 13 60 | 8 50 | 1,006 50 |
| Kennebec, Pittston Trotting Park Association | 1 00 | – | 1 50 | 6 50 | 4 50 | 7 50 | 11 50 | – | 3 00 | 15 00 | 40 50 | – | 83 50 | – | – | 698 50 |
| Kennebec, South | 2 40 | 3 50 | 4 25 | 8 65 | 10 00 | 13 40 | 18 90 | – | 4 25 | 25 00 | 15 75 | 2 00 | 108 10 | 5 50 | 1 50 | 115 10 |
| Knox, North | 7 50 | 10 00 | 8 00 | 17 50 | 10 00 | 7 00 | 6 50 | 2 00 | 5 50 | 6 00 | 15 00 | 11 00 | 106 00 | 7 50 | 11 25 | 356 75 |
| Lincoln County | 5 00 | 4 00 | 3 00 | 4 50 | – | 8 00 | 4 00 | – | 1 50 | 11 00 | – | 2 00 | 43 00 | 1 50 | 2 00 | 46 50 |
| Oxford County | 103 00 | 119 00 | – | 124 00 | 36 00 | 87 00 | 44 00 | – | 10 00 | 43 00 | 51 00 | 46 00 | 617 00 | 30 00 | 26 50 | 955 50 |
| Oxford, Riverside Agricultural | 19 25 | 12 75 | 7 00 | 10 70 | 8 00 | 10 75 | 9 37 | 3 00 | – | 16 00 | 34 00 | 10 00 | 130 80 | 11 50 | 4 50 | 228 32 |
| Oxford, West | 8 00 | 4 00 | – | 20 00 | – | 24 00 | 21 00 | 7 00 | 9 00 | 48 00 | 53 00 | 13 00 | 207 00 | 15 00 | 3 75 | 225 75 |
| Oxford, Androscoggin Valley | 17 00 | 32 00 | 13 00 | 28 00 | 16 00 | 32 00 | 32 00 | 3 00 | 4 00 | 24 00 | 51 00 | 25 50 | 277 50 | 6 00 | 17 50 | 301 00 |
| Oxford, North | 8 00 | 13 35 | 3 50 | – | 8 00 | 3 50 | 5 62 | 3 00 | 4 50 | 5 00 | 14 00 | 13 00 | 68 47 | 9 00 | 7 00 | 528 67 |
| Penobscot, West | 36 50 | 34 50 | 3 75 | 17 75 | 32 00 | 31 00 | – | – | – | – | 18 00 | 18 00 | 173 50 | 3 00 | 31 90 | 807 40 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Penobscot, North | – | – | 3 50 | 15 50 | – | 8 00 | – | 7 00 | 3 00 | 4 00 | 5 00 | – | 46 00 | – | 2 25 | | | |
| Penobscot and Aroostook | – | – | 3 00 | 4 50 | – | 6 00 | – | – | – | – | – | 9 50 | – | 3 00 | 2 75 | | | |
| Piscataquis, East | – | – | – | 1 75 | – | 2 00 | – | – | – | – | 2 00 | – | 3 75 | – | 75 | 6 50 | | |
| Piscataquis, Central | – | – | – | 15 00 | 9 00 | 3 00 | 3 00 | – | – | 10 00 | 10 00 | 11 00 | 61 00 | 5 00 | 5 50 | 501 00 | | |
| Piscataquis, West | 1 00 | – | – | 1 50 | – | – | – | – | – | – | 5 00 | 75 | – | – | – | 56 00 | | |
| Sagadahoc County | 68 50 | 78 25 | – | 74 75 | 38 00 | 34 00 | 13 50 | – | – | 30 00 | 82 00 | 42 00 | 461 00 | 12 00 | 60 75 | 1,982 75 | | |
| Somerset East | – | – | 4 75 | 34 00 | 7 00 | 11 25 | – | 1 00 | 5 00 | – | – | 23 50 | 57 00 | 10 75 | – | 141 35 | | |
| Waldo County | 1 00 | 15 00 | – | 16 50 | – | 10 60 | 5 00 | – | 5 00 | 8 00 | 17 00 | 7 00 | 84 50 | 5 00 | 8 00 | 227 00 | | |
| Waldo and Penobscot | 32 00 | 38 00 | 2 00 | 11 00 | 12 00 | 18 00 | 16 00 | 5 00 | 14 00 | 28 00 | 46 00 | 30 00 | 252 00 | – | 18 50 | 270 50 | | |
| Waldo, North | 60 00 | 15 00 | 8 00 | 10 00 | 12 00 | 22 00 | 25 00 | 6 00 | 9 00 | 18 00 | 15 00 | 14 00 | 214 00 | 6 00 | 6 00 | 298 00 | | |
| Waldo, West | – | – | 2 00 | 17 50 | – | – | 6 00 | – | – | – | 15 00 | 5 00 | 45 50 | – | – | 606 50 | | |
| Washington County | 16 00 | 24 00 | – | 24 50 | 42 00 | 12 00 | – | – | 9 00 | – | – | 16 00 | 127 50 | 12 00 | 16 75 | 252 25 | | |
| Washington, West | 38 00 | 33 00 | – | 44 00 | – | 33 00 | – | – | – | | 46 00 | 25 00 | 219 00 | 11 00 | 47 50 | 481 50 | | |
| Washington, Central | 20 00 | 34 00 | – | 26 00 | – | 10 00 | 24 00 | – | – | 10 00 | – | 20 00 | 144 00 | 16 00 | 21 50 | 261 50 | | |
| Washington, North | 7 00 | 11 00 | 5 00 | 22 00 | – | – | 21 00 | – | – | – | 10 00 | 15 00 | 91 00 | 15 00 | 34 75 | 212 75 | | |
| York County | 10 00 | 6 00 | 4 00 | 14 00 | 11 00 | 20 50 | 6 00 | – | 4 00 | 10 00 | 60 00 | 15 00 | 160 50 | 8 00 | 39 00 | 207 50 | | |
| York, Buxton and Hollis | 9 50 | 12 00 | 6 00 | 14 00 | 8 00 | – | 5 00 | 3 00 | 3 00 | 13 00 | 25 00 | – | 98 50 | 5 00 | – | 139 50 | | |
| York, Ossipee Valley | 28 00 | 50 00 | 9 00 | 26 00 | 20 00 | 31 50 | 28 00 | 3 00 | 8 00 | 49 00 | 17 00 | 6 00 | 275 50 | 4 00 | 8 00 | | | |
| York, Ramshackle Park | 3 00 | 6 25 | 11 75 | 24 25 | 5 00 | 13 00 | 6 00 | – | 6 00 | – | 15 50 | 6 00 | 96 75 | 10 00 | 2 00 | 174 25 | | |
| York, Shapleigh and Acton | – | – | 7 50 | 21 75 | – | 44 50 | 93 00 | – | 6 00 | 65 00 | 59 25 | 3 50 | 350 50 | 13 50 | 13 25 | 377 25 | | |
| York, Sanford Agricultural and Mechanical | 20 00 | 40 00 | 5 00 | 23 00 | | 31 00 | 6 00 | 5 00 | 6 00 | 56 00 | 33 00 | 17 00 | 242 00 | 10 00 | 23 00 | 336 00 | | |

## Financial Statement of Agricultural Societies—Continued.

| Societies. | Amount awarded grain and root crops. | Amount awarded fruit and flowers. | Amount awarded bread and dairy products. | Amount awarded honey, etc. | Amount awarded agricultural implements. | Amount awarded household manufactures and needle work. | Amount awarded all objects not named above. | Total of premiums, purses and gratuities. | Per cent of discount. |
|---|---|---|---|---|---|---|---|---|---|
| Androscoggin County | $54 30 | $33 40 | $15 50 | $7 00 | $3 00 | $45 25 | $20 00 | $1,806 70 | |
| Aroostook County | 20 45 | 23 25 | 9 25 | - | - | 12 35 | - | 896 05 | |
| Aroostook, North | 42 80 | 31 30 | 14 00 | 5 00 | - | 16 60 | 37 05 | 1,123 00 | |
| Cumberland County | 35 00 | 50 50 | 26 75 | - | - | 51 00 | 157 75 | 2,804 50 | 331.25 |
| Cumberland, North | 17 50 | 15 06 | 3 00 | - | - | 10 25 | 37 56 | 739 25 | |
| Cumberland Farmers' Club | 5 75 | 16 50 | 6 00 | - | - | 38 75 | 19 75 | 923 85 | |
| Cumberland, Gray Park Association | 9 50 | 13 75 | 8 15 | - | - | 20 05 | 53 00 | 1,239 20 | |
| Cumberland, Bridgton Farmers' Club | - | - | - | - | - | - | - | 134 00 | |
| Franklin County | 3 20 | 33 00 | 11 00 | 4 00 | 15 00 | 34 85 | 5 40 | 1,286 60 | |
| Franklin, North | - | 4 85 | 3 25 | - | 2 00 | 18 90 | 13 45 | 566 00 | |
| Hancock County Agricultural | 18 15 | 6 00 | 3 50 | - | - | 44 40 | 52 00 | 846 35 | |
| Hancock County Fair Association | 88 20 | 72 50 | 17 75 | - | - | 47 55 | 27 75 | 1,650 75 | |
| Kennebec County | 34 50 | 51 50 | 51 75 | 3 50 | 4 25 | 58 50 | 48 50 | 1,259 00 | |
| Kennebec, Pittston Trotting Park Association | 5 00 | 6 55 | - | - | - | 5 50 | 2 25 | 712 80 | |
| Kennebec, South | 12 35 | 13 55 | 8 55 | 1 25 | - | 37 55 | 26 00 | 568 95 | |
| Knox, North | 4 50 | 31 50 | 16 50 | 3 75 | 2 50 | 31 00 | 16 50 | 463 00 | |
| Lincoln County | 7 48 | 11 62 | 4 20 | 2 20 | 1 00 | 17 00 | - | 301 00 | 50 % |
| Oxford County | 28 00 | 35 00 | 27 50 | 13 50 | 7 00 | 28 10 | 51 75 | 2,286 35 | |
| Oxford, Riverside Agricultural | 6 25 | 9 55 | 9 15 | - | - | 13 90 | 9 75 | 1,026 92 | |
| Oxford, West | 46 00 | 2 50 | 37 50 | 1 75 | 6 00 | 47 30 | 13 75 | 1,257 55 | |
| Oxford, Androscoggin Valley | 8 30 | 28 50 | 8 30 | 4 00 | 4 00 | 14 40 | 40 00 | 1,385 25 | |
| Oxford, North | 13 00 | 7 75 | 6 75 | 3 50 | - | 20 00 | 30 96 | 610 63 | |
| Penobscot, West | 22 75 | 23 10 | 19 50 | 4 50 | 11 25 | 107 25 | 34 59 | 1,030 85 | |
| Penobscot, North | 7 25 | 13 75 | 10 00 | 50 | 4 00 | 22 25 | 14 85 | 749 60 | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Penobscot and Aroostook | 17 75 | 13 50 | 6 75 | – | – | 19 30 | – | 532 50 | | |
| Piscataquis, East | – | – | – | – | – | – | – | 344 25 | | |
| Piscataquis, Central | 3 75 | 14 40 | 4 75 | 2 50 | 2 00 | 8 50 | 6 75 | 545 25 | | |
| Piscataquis, West | 2 25 | 3 30 | 2 25 | – | 1 06 | 4 76 | 6 00 | 75 50 | | |
| Sagadahoc County | 77 50 | 71 75 | 24 75 | 3 00 | 4 75 | 58 50 | 125 75 | 2,485 12 | | |
| Somerset, East | 6 25 | 2 40 | 12 25 | 6 25 | – | 24 50 | 391 25 | 995 71 | | |
| Waldo County | 21 00 | 2 00 | 3 25 | – | – | 15 00 | 3 50 | 698 75 | | |
| Waldo and Penobscot | 41 25 | 24 25 | 13 00 | – | – | 108 75 | 35 05 | 1,657 30 | | |
| Waldo, North | 37 00 | 14 75 | 6 00 | 6 00 | – | 27 75 | 15 00 | 718 98 | 8 | % |
| Waldo, West | – | – | – | – | – | – | – | 606 50 | | |
| Washington County | 66 50 | 25 05 | 12 25 | 5 30 | – | 60 10 | 5 50 | 806 95 | | |
| Washington, West | 79 05 | 90 25 | 24 25 | 4 00 | – | 93 80 | 610 45 | 2,178 50 | | |
| Washington, Central | 65 50 | 20 25 | 8 75 | – | – | 84 35 | 67 20 | 425 77 | | |
| Washington, North | 45 25 | 17 25 | 7 00 | – | – | 52 50 | 43 25 | 879 50 | 12.00 | |
| York County | 17 75 | 27 00 | 10 75 | – | – | 32 90 | 22 50 | 1,946 60 | | |
| York, Buxton and Hollis | 12 00 | 6 00 | 3 00 | – | – | 20 45 | – | 840 95 | | |
| York, Ossipee Valley | 7 00 | 8 00 | 3 50 | 1 00 | – | 32 40 | 1 00 | 1,755 90 | | |
| York, Ramshackle Park | 5 25 | 8 75 | 4 45 | – | – | 17 00 | 10 00 | 856 70 | 17 | % |
| York, Shapleigh and Acton | 51 00 | 15 75 | 10 50 | – | – | 97 75 | 15 00 | 1,246 37 | | |
| York, Sanford Agricultural and Mechanics | 27 40 | 17 00 | 13 25 | – | – | 60 45 | 10 50 | 1,080 85 | | |

## Financial Statement—Concluded. Number of Animals Exhibited.

| Societies. | Number of horses and colts. | Number of thoroughbred bulls. | Number of thoroughbred cows. | Number of grade bulls. | Number of grade cows. | Number of oxen and steers. | Number of beef animals. | Number of cattle in herds. | Total number of neat stock. | Number of sheep. | Number of swine. | Number of poultry (coops). |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Androscoggin County | 130 | 12 | 33 | 1 | 21 | 70 | 6 | 27 | 168 | 44 | - | 46 |
| Aroostook County. | 63 | 8 | 18 | 2 | 20 | 5 | - | 4 | 139 | 82 | 8 | 61 |
| Aroostook, North | 63 | 1 | 1 | 4 | 12 | 2 | - | 12 | 32 | 34 | 9 | |
| Cumberland County | 112 | 21 | 58 | 2 | 9 | 64 | 10 | 48 | 359 | 35 | 24 | 60 |
| Cumberland, North | 42 | 2 | 20 | 1 | 6 | 54 | 10 | 24 | 193 | 34 | 36 | 15 |
| Cumberland Farmers' Club | 62 | 1 | 7 | - | 15 | 56 | 8 | 12 | 87 | - | - | 8 |
| Cumberland, Gray Park Ass'n | 38 | 4 | 14 | 3 | 21 | 50 | 4 | - | 147 | 13 | - | 30 |
| Cumberland, Bridgton Farmers' Club | 25 | 2 | 26 | 1 | - | 14 | 2 | - | 75 | 5 | 12 | 6 |
| Franklin County | 136 | 23 | 46 | 14 | 90 | 160 | 11 | 80 | 882 | 292 | 54 | 40 |
| Franklin, North | 58 | 7 | 12 | 4 | 21 | 94 | 10 | 12 | 160 | 104 | 7 | 9 |
| Hancock County Agricultural | 44 | 4 | 21 | - | - | 28 | - | - | 102 | 5 | - | 7 |
| Hancock County Fair Associa'n, | 44 | - | 4 | 6 | 10 | 10 | - | - | 77 | 3 | 5 | 1 |
| Kennebec County | 73 | 9 | 37 | - | 25 | 182 | 4 | 42 | 306 | 49 | 68 | 20 |
| Kennebec, Pittston Trot'g Park Association | 12 | 2 | - | 3 | 19 | 94 | - | 20 | 150 | | | |
| Kennebec, South | 83 | 3 | 2 | 6 | 16 | 108 | 4 | 17 | 144 | 5 | 18 | 2 |
| Knox, North | 63 | 5 | 19 | 6 | 21 | 28 | 7 | 14 | 193 | 30 | 41 | 18 |
| Lincoln County | 26 | 5 | 3 | 3 | 10 | 70 | 4 | - | 130 | 9 | 3 | 5 |
| Oxford County | 38 | 25 | 41 | - | 61 | 46 | 4 | 36 | 251 | 74 | 34 | 50 |
| Oxford, Riverside Agricultural, | 46 | 4 | 12 | 5 | 8 | 46 | - | 10 | 173 | 28 | 24 | 10 |
| Oxford, West | 41 | 2 | - | 2 | 13 | 63 | 6 | - | 147 | 20 | 7 | 2 |
| Oxford, Androscoggin Valley | 35 | 8 | 35 | 6 | 30 | 82 | 2 | 18 | 271 | 55 | 10 | 18 |
| Oxford, North | 22 | 6 | 12 | 6 | 8 | 32 | 6 | 24 | 84 | 30 | 34 | 10 |
| Penobscot, West | 78 | 12 | 21 | 3 | 20 | 32 | - | 40 | 128 | 115 | 2 | 36 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Penobscot, North. | 36 | - | - | 5 | 15 | 26 | 2 | - | 48 | - | - | 3 |
| Penobscot and Aroostook | 35 | - | - | 2 | 5 | 12 | - | - | 71 | 52 | 7 | 5 |
| Piscataquis, East | 18 | - | - | 3 | 2 | - | - | - | 5 | - | - | 2 |
| Piscataquis, Central | 42 | - | 2 | 5 | 26 | 14 | - | 18 | - | 40 | 25 | 13 |
| Piscataquis, West | 40 | 1 | - | 5 | 2 | - | - | - | - | 2 | | |
| Sagadahoc County | 40 | 20 | 60 | - | 79 | 70 | - | 75 | 229 | 67 | 35 | 117 |
| Somerset, East | 39 | - | - | 3 | 38 | 16 | 4 | 20 | 130 | 47 | 7 | |
| Waldo County | 30 | 1 | 7 | - | 24 | 28 | 4 | 25 | 70 | 8 | 2 | 15 |
| Waldo and Penobscot | 74 | 13 | 14 | 4 | 13 | 88 | 8 | 24 | 291 | 53 | - | 40 |
| Waldo, North | 25 | 11 | 15 | 8 | 16 | 12 | 10 | 27 | 131 | 12 | 5 | 6 |
| Waldo, West | 76 | - | - | 1 | 12 | 16 | - | - | 45 | 6 | | |
| Washington County | 40 | 8 | 24 | - | 58 | 12 | 3 | 56 | 105 | 40 | 22 | 20 |
| Washington, West | 64 | 7 | 17 | - | 19 | 28 | - | - | 113 | 42 | 10 | 42 |
| Washington, Central | 50 | 6 | 14 | - | 24 | 62 | - | - | 156 | 50 | 23 | 44 |
| Washington, North | 23 | 2 | 4 | 2 | 15 | 16 | - | - | 83 | 21 | 59 | 33 |
| York County | 40 | 4 | 2 | 2 | 8 | 42 | 4 | 20 | 97 | 15 | 6 | 44 |
| York, Buxton and Hollis | 16 | 21 | 17 | 16 | 20 | 42 | 5 | 26 | 141 | - | 5 | |
| York, Ossipee Valley | 16 | 9 | 31 | 4 | 15 | 164 | 4 | 12 | 242 | 3 | 2 | 8 |
| York, Ramshackle Park | 200 | 3 | 6 | 7 | 40 | 100 | 30 | 16 | 214 | 12 | 3 | 7 |
| York, Shapleigh and Acton | 27 | - | - | 6 | 31 | 164 | 12 | - | 247 | 7 | 10 | 17 |
| York, Sanford Agr. and Mechan. | 30 | 10 | 45 | 4 | 15 | 150 | 20 | - | 314 | 40 | 24 | 22 |

## A BRIEF GLANCE AT THE AGRICULTURE OF MAINE.

A Lecture, Delivered by the Secretary, at the World's Agricultural Congress, in "Hall of Columbus," Chicago, on October 18th, 1893.

In considering the agriculture of Maine, the most northeasterly State in the Union, it may be well to consider, first, her situation, geographically.

She lies between latitudes 43° 6′ and 47° 27′ 33″ north, and between longitudes 66° 56′ 48″ and 71° 26′ 41″ west. The State extends for more than two hundred and eighty miles in a due west course from the Atlantic coast, along which it extends for twenty-four hundred and eighty-six miles. Its western boundary, beginning on the north, follows the line of 71° 6′ 41″ west longitude, until it reaches the Salmon Falls river at Acton, which it then follows to its confluence with the Piscataqua, the east bank of which it follows to the coast.

The northern line, between Maine and Canada, is three hundred miles long, and the line on the east, beginning at Quoddy Head, and separating it from New Brunswick, is two hundred and thirty-four miles long.

The continuous line of Maine's coast and inland boundary is thirty-one hundred and seventy-seven miles, and her area is thirty-one thousand five hundred square miles.

With this vast area it will naturally be supposed that Maine has a great diversity of agricultural productions, that she can not only clothe and feed herself, so to speak, but that she can spare much of her productions for other states and for foreign countries.

This supposition is correct, although many of our most progressive farmers are depending on the West for a large part of their cereals, claiming that the potatoes, the sweet corn, (for which Maine is justly noted) the fruit, the hay, and the dairy products, will bring in more net income than they can possibly hope for by depending solely upon the production of all the crops they need.

This is in a measure true, but I look to see the home productions increased before many years, and our present system of farming is gradually bringing this desirable state of things about, because we are cultivating larger areas, using more machinery, and grad-

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ually developing a desire to supply our own needs, as far as possible, from our own soil.

Indian corn can be, and is raised, on Maine farms to-day, for less than forty cents per bushel, and as this is considerably below the average market price for the State, it will be readily seen that it is grown at a profit.

It is only that more can be made off our land, for our markets, in other crops, that very much more is not raised.

As the wheat area of the West decreases, and as the demand for cotton-seed meal and linseed meal from our oil and glucose manufactories increases, we shall gradually draw more from our own resources in this direction. When that time comes, our farmers will have the money they obtain for their cash crops, as a net income.

My ideal of a progressive, successful Maine farm, even at the present time, is one on which some one crop or article is made to lead for a cash income, and from which as little as possible of that crop goes for articles for home consumption, which can be raised on the land to good advantage. In other words, one which is run on business principles for an income, and is made, so far as possible, self supporting, by a proper care to produce food at home to the fullest possible extent.

Before we go into any review of our varied crops in detail, let us look at our soils and climate, for to these must any state or country look in a great measure for agricultural success. First, the soils:

We have a great variety, adapted to all kinds of crops; clayey, clayey loam, sandy loam, intervales, river bottom, salt marsh and fresh meadow.

Upon our clayey, clayey loams, intervale, river bottom, marsh and meadow, is g own the various grasses and grains, as well as potatoes.

Upon our sandy loams and higher intervales, the corn and other cereals flourish, while on the mountainous and more rocky portions of the state fruit grows in abundance and at a great profit.

One man in Franklin county having an app'e orchard of more than one hundred acres, while many have orchards of from ten to twenty acres.

There are many farms in the older portions of our State whose owners need only to take good care of their fruit trees to reap a rich harvest each year.

Not only are apples grown, but peaches, pears, and plums, particularly the latter, even in the most northerly portions of the State.

And the various small fruits, like strawberries, raspberries, gooseberries, and blackberries, flourish and make good market crops. All of our lands which are cultivated, are either strong and naturally fertile, or readily respond to the application of fertilizers. The soil in the central and western portions of the State is of a granite formation, particularly in the valleys of the Kennebec and the Saco, while in the northern part, it is of a limestone formation, and it is from this source that the soils of Aroostook derive much of their fertility.

Of our climate we can learn much from the researches of our meteorologist, at the State College of Agriculture and the Mechanic Arts, who has put much careful thought and study into his work. Daily observations of thermometers in the open air, from the first of May to the last of October, for 1892, give the mean temperature at seven A. M., to be 52 05°, at one P. M., 64 57°, and at seven P. M., 57.38°, while the average mean for the entire time was 58.45.° The lowest monthly mean being 44 77° in April, and the highest being 72.11° in July.

Comparing the air temperatures with the temperatures of the soil at various depths, we find that at the depth of one inch, the temperature of the soil was lower than that of the air by 2 32°, at the depth of twelve inches, by 4.12°, at the depth of twenty four inches, by 5.86°, and at the depth of thirty-six inches by only 7.13°.

I mention these facts to show the effect of the sun's rays upon our soil, and it will be at once seen that we get a very good condition of the soil for plant growth, by having a mean soil temperature through the five months of the growing season, at twelve inches below the surface of 54.35°.

The total amount of rainfall for the seven months, was 21.62 inches, which is very near the average for the last ten years.

Next, as an important factor in the growing of farm crops, we will observe the amount of bright sunshine for the same period. The total number of hours for the seven months was 1,424 The daily mean 6.7 hours, the highest, in July, 9.5 hours, and the lowest, in May, 4 hours.

I believe these figures give us a fair basis from which to reckon our climate, as they were carefully taken near the central part of the State.

As a further illustration of our geographical situation and our climate, I may be allowed to quote from the pen of Hon. Edward Wiggin, one of Aroostook's most prominent agricultural and historical writers: "That we are not altogether in the Hyperborean region, may be seen from the fact, probably not thought of by many, that the parallel of latitude that runs through Houlton, also runs through the city of Lyons, in Southern France, and crosses the northern part of vine-clad Italy, and the head of the Adriatic sea.

The line which marks the extreme northern limit of Aroostook county, runs very nearly through the city of Paris, that heaven of good Americans, while away to the north of this line lies Belgium and the Netherlands, the larger part of the German Empire, and the whole of the territory included in the British Isles. The Swedish colonists of Aroostook, who, in a few years, have converted a forest township into a succession of finely cultivated farms and comfortable homes, and who, by their honesty, industry, and frugality, have come to be regarded as the most valuable citizens of the county, were obliged to migrate fully thirteen degrees southward from Stockholm, the capital of their Fatherland, to reach the northern boundary of the township which was to be their home. The mouth of the beautiful blue Danube is but a few miles south of the equally beautiful Aroostook; while the Seine and the Rhine mingle their waters with the ocean, far to the north of the junction of the Aroostook with the magnificent St. John."

As this word picture portrays correctly the position of the most northerly section of Maine, it may be taken as a fair representation of her entire situation and climate.

The early settlements of Maine were made along her rivers, and by the banks of her beautiful lakes and magnificent rock-bound sea-coast. They were settled more for their advantages for fishing, lumbering and ship-building, than for their agricultural worth, but as the attention of the early settlers was gradually drawn from their first pursuits, by the onward rush of progress, the destruction of the forests, the failure of the fisheries, the decadence of the ship-building industry, and the constantly increasing demand for the productions of the soil, they came to find that they were located in a land of plenty, and now some of the shore counties, having turned their attention in a great measure away from the sea, and the inland counties away from lumbering, have come to be gaining rapidly on

some of our older agricultural sections, in the amount and value of their productions from the soil.

It may be well to note some of the early efforts for the improvement of our agriculture, and as we do this, we shall find, that while Young, Sinclair, and others, were engaged in their services for the agriculture of Great Britain, and leading citizens of Pennsylvania were carrying on the Philadelphia Society for the Promotion of Agriculture, some of the leading citizens of the then District of Maine, had organized an agricultural society, the third of its kind, in all North America, at that time. So that, as Mr. Boardman in his bibliography says, "The light stations first established in this country for the improvement, and the diffusion of agricultural literature, were Philadelphia, Penn., in 1783, Charleston, S. C , 1785, and Hallowell, Me., 1787, just thirty-three years before she became a state."

Still referring to the bibliography, we find that Mr. Moses Greenlief, as early as 1816, published a statistical view of Maine, and that, encouraged by a grant from the Massachusetts legislature, he published a larger and more valuable edition in 1829. This new edition was called the "Survey of Maine," and contained several maps. In this work are chapters on climate, natural productions, and agriculture, which are very valuable.

Of the climate, he says, "The staple productions which are found to succeed in the climate of Maine, are Indian corn, wheat, rye, barley, oats, millet, pulse of various kinds, flax, hemp, grass, and most plants of a northern climate." * * * * *

"The climate of the summers of Maine, is well adapted to all the necessary purposes of agriculture, and is favorable for the cultivation of those plants, in the production of which consists the true independence of her people." The soil in the State is as fertile as that of any of the Northern States, in proportion to its extent, that in the northern portions of the State, on the Aroostook and the St. John, is considered as far superior, unless it may be some portions of comparatively small extent "

In the year 1834, an act was passed by the State legislature, establishing a "Board of Internal Improvements."

Under authority from this Board Dr. Holmes made the first survey of the then little known Aroostook territory, in 1838. In this report, after reviewing the agricultural resources of the region, he urges the importance of the establishment of an experimental farm

in the territory, stating, as its object, "to introduce the various breeds of cattle, sheep, hogs, and other live stock, to cultivate the various crops which it is desired to acclimate, and the properties of which it is desired to test in this latitude, to introduce the various fruits which would probably grow, and thus to form a source to which the settler could look for a supply to begin his operations, or replenish his stock and crops, when degenerated or exhausted."

"Another advantage would be, that whatever would grow to maturity here, would, without doubt, thrive equally well in other and more southerly portions of the State."

In concluding this report, Dr Holmes says, "Are you a young man, just starting in life, but with no capital, save a strong arm, good courage, and a narrow axe? Go to Aroostook, attend assiduously and carefully to your business, select a lot suitable to your purposes, and with the common blessings of Providence, you will, in a few years, find yourself an independent free holder, with a farm of your own subduing, and a capital of your own creating."

The truth of these remarks has been fully exemplified in many instances, and is as true now as when it was uttered. In fact the conditions are still more favorable. Markets have been established by the building of railroads into the county, and with the ever increasing growth of population have come many advantages and privileges that were unknown to the early settlers, and which add much to the value of the county for permanent settlement.

We find that the first agricultural and industrial college in North America, was established in Maine, in the year 1821. The purposes of this institution, as set forth by its founder, the Honorable Robert Hallowell Gardiner of Gardiner were, "to give mechanics and farmers such a scientific education as would enable them to become skilled in their professions."

During this year, a yearly grant of $1,000 was obtained from the legislature, and the Gardiner Lyceum was incorporated. A stone building was erected in 1822, and on January 1, 1823, the institution was formally opened to students, with the Rev. Benjamin Hale, as President.

In his inaugural, delivered on that day, he said, (and it is my desire to call your attention particularly to these remarks, as they embody so much of the true principles of education to-day, and show how wisely our forefathers builded the agricultural and industrial superstructure of our State,) "It will not be said that the

founders of this institution, have assisted in unnecessarily multiplying seminaries of education, for it is new in character, and it is designed to supply the wants of a large portion of the community, for which no provision has hitherto been made. Nor will it be said that these wants are not real. The education of the advocate or the Divine, is scarcely more necessary to his success than that of the mechanic or the farmer. If the professions of the former are themselves branches of science, those of the latter are founded in science, and as we expect empiricism from those who enter the learned professions without a suitable preparatory education, so we can expect nothing but deficiency of skill in mechanics who have been taught only the manual exercise of their arts.

There surely can be no reason why mechanics and agriculturists should not be instructed in that science which will enable them to follow their pursuits, not blindly, but from rational views. Those who have not this education, may indeed copy faithfully the practises of their fathers, but we can not expect from them improvements which shall enrich their country and benefit the world."

An institution, started at such an early date, and with such a mind at its head, could not fail of accomplishing good results, and although it ceased to exist as a separate institution in 1837, its effects are everywhere apparent in the agricultural progress of the State.

We now have a State College of Agriculture and the Mechanic Arts, amply equipped for its duties, doing good work, enjoying the confidence of our people, and whose graduates are sought from all sections of the country, when work in their lines is wanted.

It was established as a separate institution in 1865. There is a fine farm connected with it, and with the Experiment Station, which forms a part of the college, it forms one of the grandest institutions for obtaining a practical education in all industrial lines in our country, and all without tuition or fee, except for actual expenses of students.

In addition to our college, we have a Board of Agriculture, consisting of one member from each county, with permanent headquarters in our State House, organized and endowed, for the purpose of holding farmers' institutes in every section of the State, two State Agricultural Societies, one State Pomological Society, and nearly fifty incorporated county agricultural societies, paying out annually, in premiums, more than $10,000. These societies


HAY FIELD OF J. A. JONES, FRYEBURG.

all receive assistance from the State, which is very liberal in its appropriations for agricultural purposes.

These organizations, with an active and efficient cattle commission, formed for the purpose 'Of facilitating and encouraging the live stock interests of the State of Maine, and for extirpating all insidious infectious and contagious diseases,' it will be seen that the State is quite well equipped for battling with all the different problems that may arise affecting our agriculture.

As a hay producing state, Maine ranks high, and the products of her fields find their way into many markets, amounting annually to more than one and a half million tons. In the growing of grain, she is well to the front, especially oats, of which she produced in 1880 2,265,575 bushels, from 78,785 acres of land, or an average of 38 bushels per acre, with a value of $1,550,788. And of wheat, she produced in 1880, 665,714 bushels, from 43,829 acres, making an average of 15 bushels per acre, and in 1890 she produced 660,000 bushels on 41,077 acres, an average of 16 bushels per acre, and with a value of $735,435.

Of corn, she produced in 1880, 960,633 bushels, from 30,997 acres, an average or 31 bushels per acre, and in 1890 1,107,000 bushels, from 29,526 acres, an average of 37 bushels per acre, with a value of $8,851,730.

These figures all show an increase in value in the average amount grown per acre, and in the total amount raised. The practice of sowing mixed grains, such as barley, oats, and peas, and oats, wheat, and peas, is becoming quite general, and will, no doubt, increase enough to be recognized as a farm crop in our next census.

The production of sweet corn for canning (for the production of which Maine is particularly adapted) is rapidly increasing, and has already reached immense proportions, the total pack in 1890 being 12,092,536 cans, representing 3 023 acres, with an average of 4,000 per acre. The value of her orchard products of all kinds, sold or consumed, in 1880, was $7,112,026. Nearly $200,000 coming into one county alone, and in 1890 it was 7,204,184. The yield of potatoes in 1880 was 7,999,825 bushels, on 70,147 acres, or an average of 113 bushels per acre, Aroostook county alone growing 2,218,594 bushels, and 1890 it was 9,666,153 bushels, on 85,541 acres, making the average, 113 bushels per acre.

Possibly I may be allowed to quote from Mr. Wiggin again, for the purpose of showing the peculiar adaptability of the soil of

Aroostook county, for growing potatoes, "An an evidence of the fertility of the Aroostook soil, it may be stated that in the great contest for the *American Agriculturist* prize of 1888, for the best acre of potatoes, open to all North America, three of the five largest yields were raised in Aroostook county. The first prize 738 bushels, the third prize 537 bushels, and the fifth prize 523 bushels.

In 1890 we had 144,702 horses and colts, 138,661 oxen and steers, 138,994 cows, 370,602 sheep and 33,445 swine, with a total value of $15,747,468.

No other state, I think, exceeds Maine in the production of gents' drivers and fine road horses, while she stands in the front rank in the production of speed, her horses taking first place on many tracks all over our country.

The raising of French coach horses is assuming some importance in the State, and as they are better known, their numbers will, without doubt, increase.

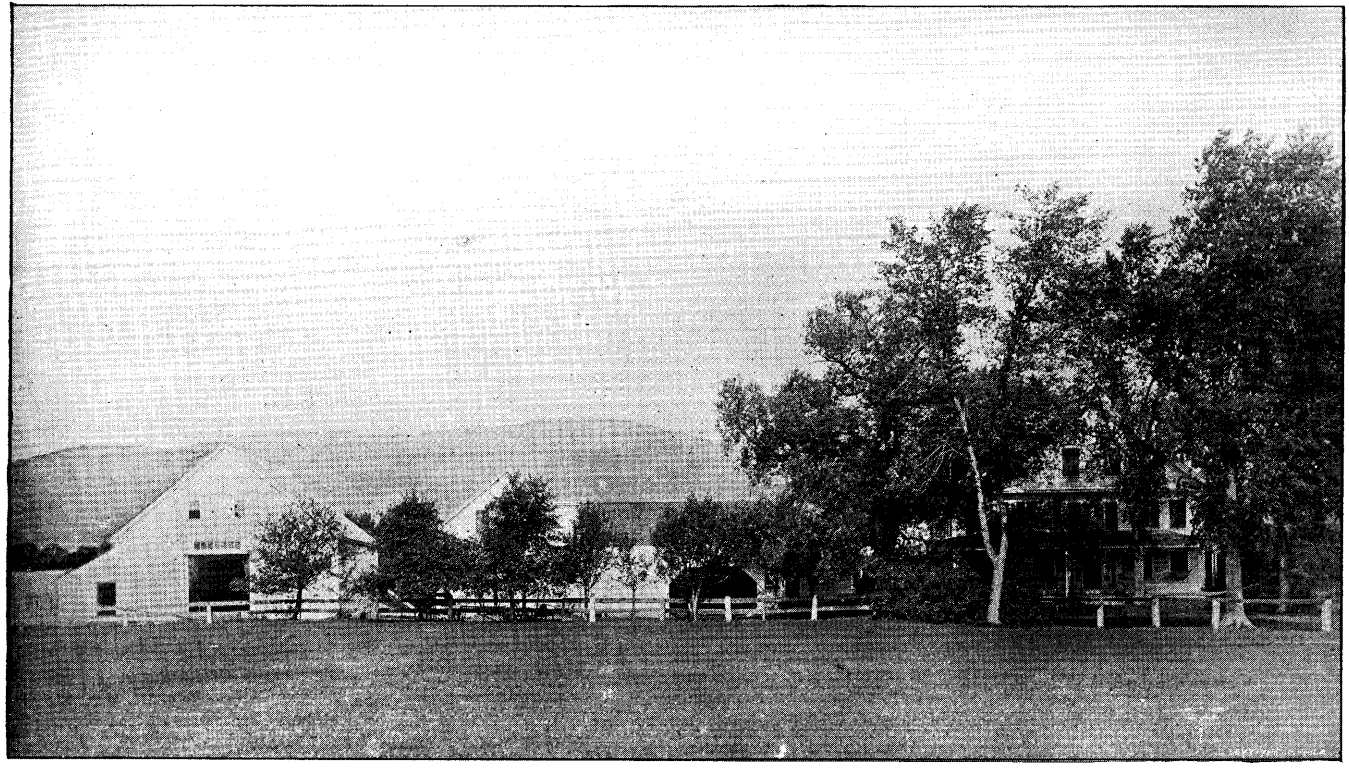
The introduction and breeding of thoroughbred animals received early and careful attention from our Maine farmers, and in 1827 imported Shorthorns were brought into the State.

Very soon thereafter, Herefords were introduced by our breeders, and were sold from here into many of the western states. While we have a distinct family of Jerseys, with a Maine herd book registry from importations of Dr. Holmes in 1885. Many of these Maine Jerseys are very superior animals and stand high in rank as butter producers.

There are also many A. J. C. C. Jerseys in the State, mostly from good families, and possessing true merit. Our most important breeds are Jerseys, Herefords, Holsteins, Shorthorns, Ayreshires and Guernseys.

All of our farm stock is in excellent health. Associated dairying claims a large share of the attention of farmers, and brings a large amount of money into our State. There were thirty-eight factories in the State last year and their total output was

The manufacturing of condensed milk, is a new branch of our dairy industry, and we have two large and finely equipped factories, one of which is turning out a fair amount of goods, which command a ready sale, it would seem that with our fine facilities for producing milk, with our cows free from disease, our clear-running brooks and ample pasturage, this should become of much importance to our State.



FARM BUILDINGS OF B. B. WOODWARD, FRYEBURG.

Sheep-husbandry also, attracts considerable attention, particularly in Somerset, Washington, Waldo and Aroostook counties, and the latter is becoming famous for the production of some very fine sheep of the mutton breeds. Shropshires are the favcrites, with Southdowns, and Hampshires following close behind.

There are 65,000 farms in Maine, containing 6,552,578 acres, and of a cash value, including buildings and fences, of $102,557,615, and an estimated value of all farm products sold, consumed and on hand for 1893 of $22,000,000.

Thus it will be seen, that even from the earliest settlement of the State, and with her great diversity of productions, agriculture has always received a fair share of the attention of our people, and that our averages show an advanced state of farm culture. Situated, as we are, within close proximity to the larger markets of New England, we have seen the necessity for thorough work, and the clean culture of the small farms, which dot our hillsides and adorn our river valleys, speaks in eloquent terms of the good cultivation they have received.

The literary and social side of our farm life has not been neglected. From nearly every hamlet and village in our State rise grange halls, mostly owned by those who occupy them, and where the farmers and their families meet regularly for social and literary entertainment, which is conducive of much good. In the grange, our farmers have learned much of the dignity of their profession and their proper place in the economy of State. In the grange, they have discussed those vital questions of farm polity, and become intelligent along lines of thought, which would have been impossible for them to have reached in any other way.

Many of our grange halls contain libraries, filled with books of interest to the profession and to the young, thus becoming the center of much information. And while the organization has been the means of bringing us together into one body, with rules of action governing the whole, it has also taught us the virtue and necessity of individual thought and action, thus bringing about that happy condition of affairs which tends to make every farmer a sovereign in his own right of mind and heart, and every farm a true sovereignty.

While the comfortable, commodious, and often luxurious farm buildings which everywhere abound, and which form a pleasing part of our grand mountain and river scenery, are monuments of

the thrift and industry of our people, and form one of the strongest bulwarks for the protection of our American institutions, the real home for the old and young, to which those who have passed the mile stone on the top of the hill, can look for comfort and happiness until they shall pass into that grand home beyond the ken of mortal man, and from which shall go forth, year by year, those in the youth and prime of life, to confront and subdue the stern realities of life, and to adorn the pathway of the industrial and social world.

# REPORT OF PROCEEDINGS

OF

# STATE DAIRY MEETING

## HELD AT FOXCROFT, DEC. 12, 13 and 14, 1893.

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Wednesday, A. M., 10 o'clock; meeting called to order by A. W. Gilman, President of the Board of Agriculture.

### ADDRESS OF WELCOME.

By J. B. PEAKES, Dover.

*Ladies and Gentlemen:*

Before you have left you will be sure that this is a very peculiar town. They don't ask you anything to come, but always ask you something to go away When I came across the bridge this morning I came across to see this butter, but before I go back I find the penalty is that I have got to make a speech.

Now the chairman has introduced me in a manner that was entirely wrong. I have done no more than it was my duty to do, and the legislature did no more than it was their duty to do. It is true that at the request of the Board of Agriculture I did introduce a bill which made the Board a part of the State government, and the Secretary a State officer, and gave him a salary which I think was proper and right, so that he could attend to the business of the office. I think I did also, introduce a bill which increased the appropriation for Farmers' Institutes to $3,000. I was requested to do it, and did it willingly, and the legislature voted it willingly.

I am not a farmer although I was raised a farmer. I am glad to meet you here to-day Our county is a small one, but when we pull together, as we shall to-day, we are pretty large. I say to you, my friends, that in all the State there is not a more thrifty community, there are not more capable or better farmers, and there are not prettier women than in the county of Piscataquis. I am very glad that this State dairy meeting is called here in Foxcroft. Now we are proud of our county, we are proud of our people, and we are proud that we can show you into such a beautiful hall for the meeting. We hope that you will have a good time, and hope that you will enjoy yourselves, and hope that you will get acquainted with our people, and that we shall get acquainted with you. In the future, when you think of Piscataquis county and Piscataquis people, you will be satisfied that there are no people who are doing more for the agricultural interests of the State at large than we are doing here in Piscataquis.

I don't know as I can say much more except that the people of Foxcroft, of Dover, and of Piscataquis county, bid you a hearty greeting.

## RESPONSE,

By Hon. WARREN H. VINTON, Gray, Member of the Board of Agriculture for Cumberland County.

MR. CHAIRMAN: This matter of welcoming and matter of response is not supposed to amount to much, it is not necessary to have much preparation to speak on either. The Board of Agriculture has come to Piscataquis county to attend the dairy meeting, and my brother Peakes, bids us welcome, and I have to say to our brother, Peakes, in reference to our being here, that we knew we should be welcome before we came. We came by invitation, and people who come by invitation have a right to expect that they are welcome, if the invitation be not a fraud. In addition to that we come up into a good farming section, made up of good men and women. I understood him to say it was a little singular in some of its aspects. I have to say to him that we are singular who come and respond. It is a singular class of people that you bid welcome to the valley of the Piscataquis. We want to say to the people of Foxcroft and Dover that they bid welcome here no thieves or quack

doctors, or anything of that kind. It is a body of farmers, men and women engaged in the tilling of the soil, as Adam, their father was.

They are honest. Brother Peakes, the people you bid welcome to Foxcroft and Dover, will not steal anything here. If we are safe in your hands, you are likewise safe with us. Now we come here for what? If we are singular in ourselves, we are singular in what we bring here. We have come here to compare our individual prosperity and hardships, if we have had any such during the year, with the farmers in this part of the State. We are a family of farmers scattered all over this great State. We have now come to bring here our experiences of the past year, and compare them with the experiences of the farmers here. If we have had prosperity, and we have had a degree of prosperity the last year, we bring that. If we have had adversity, we bring that and lay it down here together and compare it with one another. We don't come here bringing any great disaster. We are in the midst of disaster. There has passed over the whole country within the last six months one of the most remarkable financial disasters and overthrows that we have ever known.

But what are we? Do you know anything of failures except what the papers have reported to us during the past six months? Do you know any farmers that have failed? Where is the farmer who has been running his bail anywhere in this country? Where is the man that is a farmer that to-day is in the midst of financial disaster? The farmers stand up to-day a safe and comfortable people, good-looking, and having good clothes, and just as competent to stand up and be looked at in any community as they ever were. Now, as I sometimes have occasion to say, if farming, carried on as it is to-day, in the slipshod way, with the little interest we take in it, and the lit le time that is devoted to it, if it will take care of its men, women and children, as it does do, day after day, year after year, it is not for us to state that the farm business is a failure.

I have therefore to say in behalf of the Board of Agriculture, that it is glad of the opportunity to come here and mingle with the farmers of Piscataquis. I have to say that they are not only glad to come here, but they are glad to bring their business here and compare it with yours, and everybody else. We come bringing our butter, farms, and silos, that is what we come to bring and consider.

## DAIRY EDUCATION.

By G. M. GOWELL, Professor of Animal Industry, Orono.

A glance backward a few years to our early boyhood, brings to mind the condition of the dairy industry as it then existed, and enables us to more readily see, by comparison, the advance that has been made.

Twenty-five or thirty years ago dairying was not considered a leading agricultural industry, but rather an adjunct to cattle growing.

The stock of the country had been chiefly natives and grades of the Shorthorn, the only improved breed that had been introduced.

The cows usually calved in March or April so that the calves might be weaned when ten or twelve weeks of age, early in June, when the grass had made a good start in the pastures.

They continued to give milk until November, when the grass was frosted, and the corn-stalks gone, when from lack of nutrition, and force of the habit that had been inherited from all preceding ancestors, they went dry, and became non-producers for the next five or six months.

Sometimes an anxious farmer, to help out the milk supply for butter or cheese making, would wean the late comers, the May calves, early, and later on when these calves had arrived at the dignity of steerhood, and showed a suspicion of stunted growth, the neighbor boys were apt to say that "they had been knocked in the head with the churn dash," referring to what they regarded as the mean practice of their owner in cheating them out of what was justly theirs by inheritance—food from their natural mothers.

If the cows yielded one hundred pounds of butter per year, it was regarded as the maximum quantity.

The milking was done in the yards, generally by the women of the household, it being deemed rather degrading for a manly man to milk.

In milking, strippings were saved, and the fore milk set in small shallow pans in the cellar, for the cream to rise.

The strippings were mixed with the cream and soured until thick, for churning.

The dash churn, and large wooden bowl, completed the outfit.

These methods and utensils were counterparts of what had been employed since your ancestor caught, subdued and milked the very first cow, and having set some of her milk aside in an earthen dish, of his rude handiwork, observed that the better part separated and came to the surface, and, when upon agitation or stirring, the creamy substance was still further condensed, he called it butter, and made the simplest implement he could, to do the stirring with —the dash churn.

If there is in the history of our civilization a parallel to the simplicity of methods and appliances that have attended this industry, I have failed to find it.

Dairy literature was meagre indeed.

Not until 1871 did Willard write his "Practical Dairy Husbandry," or until 1869 did Flint publish his book on "Milch Cows," and "Dairy Farming."

There were but few agricultural papers published in the whole country, and their circulation among the working farmers was very limited.

The first stimulus was given to improvement in dairying in Maine by the introduction of the Channel Island cattle about 1855, when two of the earliest importations to America were made to the Kennebec Valley.

These animals were then all called Alderneys, without regard to which of the Channel Islands they came from.

In a few years their pure blood and grade descendants had become distributed into localities in nearly every central and southern county, and proved to be the nucleus from which the present magnificent dairy stock of our State has been evolved

Contact with these animals taught their owners new lessons and gave promise for the possible future.

Enthusiasm was aroused and the little band of co-workers united in organizing the State Dairyman's Association in 1875, which held annual winter meetings, of two and three days each, where papers were read and discussed, experiences given, and theories presented and criticised.

The History of Dairy Education and Improvement from that time to this has been gradual but constant.

The recognized standard of butter production has been raised from one hundred to three hundred pounds per annum.

Instead of the off flavors of "between hay and grass" in spring, the "dog days" of mid-summer, and the frosted grass of late fall, the quality has been raised to a high degree of uniformity throughout the whole year.

But in this great improvement, we had by no means to begin at the bottom round of the ladder.

The Jerseyman had been down there a hundred years before us.

We took the cow that he had made by a century of thought and care, and built upon her, and set about the task of training ourselves for better work.

Opportunities for information have been freely furnished.

The agricultural publications of the country have multiplied in number and improved wonderfully in quality.

Most of them have special dairy departments, and there are several devoted entirely to the industry.

The experiment stations have aided with careful and extended experiments.

For nearly fifteen years this Board of Agriculture has had dairying considered at almost every institute it has held.

What has been done in Maine is now being done in every state from here to Minnesota.

The unskilled dairy farmer of years ago was sufficient for the situation and met the requirements as they then existed.

The demand for better butter and cheese did not exist until the improved articles had been put before the people.

Public taste has been cultivated by fine flavors, not for them, and now, nothing but the nicest will satisfy it. The dairy artist taught consumers to discriminate between common and choice butter and cheese and has made fine quality possible everywhere and now every dairyman must be an artist.

Diary education consists of: An understanding of the principles of breeding and their application; a knowledge of the different soils and their adaptation to the growth of the various grasses, grains, and forage crops, that by their cost and feeding value are most desirable; the influence of foods upon the quality of milk, cheese, and butter; the combination in rations that yield best results at lowest cost and smallest waste; the treatment and handling of milk and cream, and the manufacture of butter and cheese by the most perfect processes; and a knowledge of the business

management of creameries and factories, together with an acquaintance wi h the market requirements and how to meet them

The instruction given by the traveling dairy schools of other s'ates and the British Provinces, as well as some of the European countries has been confined almost exclusively to teaching the processes of the manufacture of butter and cheese.

The institutes have treated the subject more broadly aiming to elevate all its features.

The improved condition of the dairy industry is probably due more to the influence of personal contact, and observation of what others were doing, and to the agricultural press, than to all others combined.

The agricultural papers ar- not always true guides.

While they have taught much truth, they have also taught much fallacy.

Men write for the papers for various reasons: some because they like to think they are literary; others draw conclusions from single tests, and report them as established facts; and other men with skill in journalism, but unskilled in farm matters, publish a few columns of agricultural generalities in each of their weekly issues, and from their inability to discriminate between the wheat and the tares, it all goes in together, and the man who is trying to train himself for his vocation, by relying on these sources for his authority is very frequently misled.

The true, clean, agricultural, weekly papers are the farmer's most readily available means of information.

Within the past two or three years the State colleges in a few instances, have established short courses in agriculture, for those persons who were so circumstanced that they could not take the full courses there.

These courses are free to all and no entrance examinations are required.

Our State College was one of the first to introduce these short courses, and for three winters young farmers have had opportunities there for study and training, that have never before been offered free to the people of any country in the world.

Dairying is one of the leading subjects studied.

Instructions are given by lectures, and practical work, upon its many features.

Commencing with cattle breeding, the principles are made familiar and applied to the living animals for illustrations.

The student studies the breeds and their characteristics and gives much attention to judging animals by the different scales of points, and tracing and tabulating pedigrees.

The veterinarian teaches of the anatomy of the cow, her diseases and their remedies.

In cattle feeding we study the methods of growing the crops fed on the dairy farm; the chemical composition of feeding stuffs; the food requirements of animals; the formation of rations that shall be most productive and least costly, and practical feeding and handling.

Milk and its products are dealt with throughout the term, viz.:— Formation of milk, its variation in different breeds, quality, testing for fat and other solids, treatment, creaming by gravity and the separator; cream ripening and churning and the details of manufacturing butter, the making of different kinds of cheese by the most acceptable processes, testing the qualities of butter and cheese, and judging by scales of points.

The business management of factories and creameries is carefully considered from the receiving and determining the value of milk from its fat content to the final settlement of all accounts.

This instruction is given by lectures and by practical training in the milk, cheese and butter, laboratory and engine rooms of Dairy Hall—a building constructed and equipped solely for this purpose, —and the cattle stalls, and feeding floors, at the barns.

A term of three months here, is not an idle lark for the farmer's boy, but a training in which his mind must be active if he makes the most of his opportunities.

Perhaps the education of the dairyman in the past was sufficient for his time and life, but we must educate for a future, in which, only he who is possessed of high skill of mind and hand shall be deemed worthy of our vocation.

## A FEW REMARKS MADE AFTER MR. GOWELL'S PAPER.

By Gov. HOARD, Wisconsin.

I want to say a word along the line of skimmed milk. I think the words of the Professor contain the germ of much good truth. Now here is the problem: What shall I do that will meet with the largest profit? That question comes right home to me, to the Maine Man, to the Wisconsin man. There are some things that have been proved in the past ten years in the feeding of skimmed milk to cattle. The mistake of the farmer has been he has not studied the physiology of his cattle. I will give you a little experience. When we started the Hoard creameries we wanted our farmers to understand the good qualities of skimmed milk. So we made a series of experiments. We bought thirty pigs, averaging one hundred pounds each. Bought them in the pen and paid $4.50 per hundred for them. We fed them skimmed milk just as the careless farmer would.

We kept these pigs for fifty-six days on nothing but skimmed milk, no grain; the milk was weighed out to them each day, and at the end of the term they were sold for $4.50 per hundred. The gain in weight brought us twenty-two and one-half cents a hundred pounds for our skimmed milk. This gain was largely due, remember, to the fact that we fed the milk to young pigs. Now, had we fed it intelligently, as we should have done, that is, mixed it with shorts and corn meal, the extra growth would have paid for the shorts and corn meal, and returned as we calculated, about twenty-eight cents a hundred for the milk. You see it must be fed to young pigs, and the final weight not carried beyond 175 to 200 pounds, if you are to make a profit. Skimmed milk or any other food fed to heavy hogs does not bring a profit.

I can make skimmed milk worth ten cents or thirty cents, a hundred pounds, according to the weight of the pigs.

Every feeder knows that a pig six months to a year old, makes the most rapid growth proportionately, and it is the same with the young of all animals.

We fed it stupidly. We wanted no farmer to jump up and say "That is the Hoard way of doing it." Had we fed it wisely we would have mixed that skimmed milk with corn meal and shorts.

I would, if I had time, give you a series of experiments in our creameries with our pigs and calves. It has got so we cannot buy the skimmed milk of our farmers.

*Ques.* I would like to ask if you have had any experience in feeding skimmed milk to cows?

*Ans.* A number of the correspondents of *Hoard's Dairyman* practice feeding skimmed milk to cows There has lately come up the question of tuberculosis in feeding skimmed milk to cows. If there is any taint of tuberculosis in the herd it might cause injury.

*Ques.* Wouldn't the injury be just as great if the skimmed milk was fed to any other stock?

*Ans.* No, not if you fed it to the pig; he is not as easily affected as the bovines are. He has a greater resisting power, and if you do feed it to the pig he only gives one article of food to man; that is meat, and that is cooked. But the bovine gives you back milk, and butter, and cheese, eaten nearly always uncooked.

*Ques.* In a feed of skimmed milk and corn meal how would you mix it, what proportion?

*Ans.* You must have recourse to the due proportion of nutritive elements Skimmed milk is almost a pure albuminoid. It does not have much if any fat in it. Corn meal is carbonaceous, fat producing. Skimmed milk is muscle and bone producing. Shorts are also quite carbonaceous. I would mix for young pigs, on an average of about 100 pounds of skimmed milk, and twenty or twenty-five pounds of corn meal, and about the same quantity of shorts or middlings. A ration of 100 pounds of skimmed milk, twenty-five pounds of corn meal, and twenty pounds of shorts is an extremely stimulating, growing food for pigs.

## THE PROGRESS AND CONCLUSION OF MODERN SCIENCE AS APPLIED TO PRACTICAL DAIRYING.

Hon. W. D. HOARD, Fort Atkinson, Wis.

*Ladies and Gentlemen*: I am advertised to speak to you along the lines of this thought: The progress, and some of the conclusions of modern science as applied to practical dairying.

When I tackled this question I found it grew so big on my hands, and the legitimate deductions of it leading out to all practical things, that I despaired of my own existence or yours, if I continued to the end of it. It is so full of suggestions, the one word "progress." So unconscious are we of even the progress of our own times. We are unconscious of the progress and change in our own intelligence, how to-day we are making use of such appliances as we find here, and in a year or two they are second nature to us, and we almost feel as though they had been born to us in our cradles. So the word progress in dairying, to make this little talk practical to you, would have to be carried out with a fidelity of detail that would take up very much time.

I notice in the constitutional make up of the mind of the farmer, whether he lives in Maine or Wisconsin, a certain degree of prejudice that is due to the fact of his being born where he was. He is conservative. He doesn't feel as though he dared to believe half of the time; he doesn't say "Lord help my unbelief," and yet he has too little faith. But progress is reaching out and taking him right along, willy-nilly he has to go, he can't help himself. He doesn't make the money he ought to, he doesn't get the amount of information he ought to, he doesn't become as prosperous as he ought to. He is taken along too much at the tail of the procession. It is true in Maine and Wisconsin that very few men are getting from dairying that amount of reward that they ought to get, and that every well wisher of his fellow men is anxious that they should get. Prejudice is making the farmers sneer at what they call "book farming." There is no such thing as 'book farming." Farming is bringing out of the reluctant womb of nature certain results, and those results are always accomplished by thought and labor.

Now, because these things are discussed in books and journals, farmers have a prejudice against them, and when you say "science"

to the average farmer of the United States, that very moment he begins to buckle up against it. "I don't want anything scientific, I want it practical." I want to spend a few minutes along these lines. What is practicability? I hear any quantity of farmers struggling in the depths of discontent, putting on airs about being practical. They are the most unpractical men I ever saw. Practicability is that which can be put in practice. Any truth which you can make profitable to you is practical. To-day a man who has given thought to these questions can make practical many things which neither you nor I, nor he, could make practical without thought and study.

Now take some of the conclusions of science. I remember as a boy, when every pound of butter and cheese consumed on the Atlantic seaboard, was made east of the Alleghanies. To-day but a small portion of the butter and cheese made in the United States is made east of the Alleghanies. Particularly butter. The state of Iowa alone sends out every year over thirty million dollars' worth of butter. The state of Wisconsin every year produces fifty million pounds of butter, and about thirty million pounds of cheese, and Wisconsin is not to-day one-third of it under the cultivation of the cow. I believe that Maine, for her future salvation, and that of the farmer, has to look along down the line of the production of the finer grades of food, that the production of the grosser foods of the country brings to you loss and waste. You have the local market, and have the privilege of putting choice foods into the market within twenty-four hours, when it takes over five days to get ours to the seaboard. You have a thousand opportunities to make fine foods, fine butter, fine cheese. The finer and more skillful productions that come within the range of scientific thought, will bring money to the farmers of Maine, when to produce grosser articles and come in competition with the wheat producers of the Red River, and the beef producers of the plain, will be simply putting a square block in a round hole, and it won't fit. Now this is practical science. It is your thought and ability which will make any work practical.

Now there is no business to-day on the farm that has been so wonderfully reinforced by the thought, the concentration of purpose, the earnestness and single-mindedness of scientific students of Europe and America, as has that business that clusters around the cow. Do you know of any business to-day that has brought

any such wealth of invention about it as has the production of milk? Science is a handmaiden, a most dutiful one, who has been doing everything she could for the farmer. What shall the farmer do? Put himself in harmony with this thought. Let him cast aside all the prejudice which he may have received from any other cause and let him say I will understand it. I will make more profit from it if I can. We are all after the question of profit. I believe that is right. If I am not making money I am a good deal less of a man, I notice that; I am a good deal less of a husband and a good deal less of a father. And I notice if I am prosperous I am more contented. Now is there anything wonderful about that?

Take one instance of the assistance that science has given you, the Babcock Tester. As a member of my family contributed to this that bottle, I have a right to speak about it. My son was the inventor of that bottle, Dr. Babcock was the inventor of the test. Both contributed to the well being of dairying from the efforts of their minds, without money and without price. The Babcock Tester can be made very practical to the every day farmer. How? It will cost him from eight dollars to twelve dollars to supply himself with a little machine like this and bottles sufficient to make a test of his cows. There is eight dollars and the interest of eight dollars is forty cents per year at five per cent and at six per cent it is forty-eight cents. Money is never worth more than the interest of it, I wish we could always see that. Never any more than the interest of it. Fifty cents a year will put you in possession of the means of saving yourself may be fifty dollars a year, and there are men who would not give fifty cents for a dollar bill. Now there is a shortsightedness that comes from prejudice. Fifty cents a year in interest will enable you to buy a Babcock Tester. What can you do with it? You have, say, ten or fifteen cows. I doubt if there is one farmer in twenty who knows what his cows are doing. I have six hundred patrons and I know what dairy farmers are from study of them. I go to many of them and say "Why don't you test your cows?" and they say, "I know what a good cow is;" I say, "No you don't." "Well my wife does, anyway." I say, "No she don't, I don't believe it." You have twenty cows; do you know which cows are paying you and which are not? I went into a herd to buy a cow. The owner said, "I will give you your pick for sixty dollars. I will sell you mine for twenty-five dollars." I said, "Which do you think I will pick?" He said, "That big Shorthorn cow. Which

would you pick?" "That little one there I will sell for twenty-five dollars." "How much does she give?" "Twenty-five pounds a day." After I talked with him a little I said, "I will take the little cow" I imagined her to be a better cow than she looked and the other to be poorer than she looked. I took the cow home and I tested her; she was giving a pound and a half of butter on twenty-five pounds of milk. The other took thirty-eight pounds of milk to make a pound of butter. She gave forty-five pounds of absolute swash. He worshiped her. He believed in her He said she was the best cow in his herd. He wanted sixty dollars for her and yet sold me the best cow in his herd for twenty-five dollars. Was that man practical? That is one of the conclusions of science in practical dairying When a man buys a cow it is a good thing to know the cow. The test is a good thing to have in the house constantly to test the cows and tell whether you are boarding a cow that pays or not. A test covering over 10 000 cows and recorded in my books to-day shows me that a large proportion, nearly forty per cent of the 10,000, don't pay for their board. I am telling you the truth covering the record of 10,000 cows. Is there a man here that has taken as much pains to find out what is the truth about his cow? If forty per cent of the ten thousand cows didn't pay for their board where was the profit to the men that kept the ten thousand cows? If four thousand of them had been swept out of existence and they had done business with the six thousand, there would have been more profit in the end. A man said to me: "I am surprised to hear you talk like this. You want men to improve their cows and make three hundred pounds per cow. Where will butter be when you get there? It will not be worth five cents a pound." I said, "Now you keep twenty cows that produce one hundred and fifty-five pounds of butter apiece. When that time comes you can keep ten cows and make a good handsome profit on the keep of the cows you don't keep. Do you see it?' We can have half the number of cows and make just as much money with better cows. We have been getting along these lines a great deal of scientific thought for the benefit of the really practical dairyman and farmer. There are men making a study of the scientific and physiological laws of breeding good cattle. In the talk this morning I was wonderfully interested to learn of your experience with the Jersey cow. It would have been worth, my friends, tens of thousands of dollars if Wisconsin had had the opportunity in 1855 of having

planted in her midst such dairy bred cattle as were planted in your midst. Science has been teaching us the laws of breeding. I want to say a few words on that. I gave you a talk once at Winthrop upon the dairy temperament of cattle, illustrated with life size figures of noted dairy cows. I gave you some part of the talk at Auburn. I am studying it with just the same determination to-day as I was then and I find coming to my hand constant vindication of this principle of dairy temperament. We find it to-day right in our own creamery patronage. I want to give you a clear idea as to what it means. This is a little pamphlet such as we use in the Hoard creameries, for the purpose of giving to the patron a statement of the value of his milk for the year. Every man can look it over and see for himself how "one star differeth from another in glory."

On the last page I find George W. Burchard. This milk is taken into the creamery and the farmer gets his due according to the butter found in his milk. I find in Mr Burchard's milk that the dividend was, last November, $1.65 per hundred pounds; December, $1.59; January, $1 78; February, $1.46; March, $1 45; April, $1 47; May, $ 98; June, $.92; July $ 97; August, $1.19; September, $1.40; October, $1.50; a total average of $1.36 per hundred pounds. And let me say by virtue of being studious along these lines that herd of cows gave more butter fat per one hundred pounds of milk than any other of the one hundred patrons We paid him $65 per cow in cash and returned him the skimmed milk, which was worth $15 more. We would have been glad to have given him $15 for it Sixty-five dollars for a cow per year, nineteen cows, nine of them two years old heifers. Now I want to call your attention to the record of another man. Here is a man by the name of Fred Boldt. We paid him $.93 per hundred. Mr. Boldt's reward from his cows was about 1,000 pounds of milk less than Mr. Burchard's, and yet these things fail to convert Fred Boldt. Doesn't that show how much gospel has to be preached to a great many men and we really feel as though they ought to be converted. This gospel has been preached to these men weekly, $.93, $1.36. Do you believe the old story that men really want money? I don't. I believe the majority of men, as a rule, care more for their own notion of things, my wife says she knows that is so. Fred Boldt had rather stick to those cows of his at $.93 than to change. I talked to him about it. I said, "Fred, have you

looked over your record?" He said, "Yes, I looked them over." Very cross. "What do you think of it?" "I think it is a humbug." "Why do you think it is a humbug?" "Well, you have got me down only $.93." "Isn't that right?" "I don't know whether it is right or not." "No, it is not right, and you are not right either; that is the reason the record is not right. You know that is true and honest. You have had your milk tested, and have proved whether we were testing it correctly. You have been told to bring your milk over and test it yourself. You have been told to test the tester. You have never yet failed to find that it was correct." I said, "This is the lesson. Isn't it about time for you to make a better dairyman of yourself? Don't you think it worth while to put thought into this matter and make a larger profit? Can't you do it?" "I can't be a Gen. Burchard if I tried till I died." "You can be a Fred Boldt with a good deal larger record can't you?" I talked this way to him and finally he softened down and said, "Well, what shall I do?" I said, "Go to work and improve your cows. Put some better blood into your herd. If you buy a cow buy a good one. You won't pay $50 for a good cow, but you will pay $30 for a poor one. Don't be penny wise." I think I have got Fred started a little.

There is one thing I want to say to-day to the farmers of Maine and the farmers of Wisconsin. This matter of dairying calls for a wider education on dairy farming. Wider not higher; take in a larger number of facts. You can make your fortune on the hills of Maine, with the cow. You can do it. I have seen in my own township, land which could be bought for twenty-five dollars per acre in '71, to-day is selling at ninety dollars, and men are snapping up these farms, and only a few years ago it was impossible to find a contented man upon his farm. The Germans who comprise seventy per cent of the population have been taking up these farms. The creameries and dairy education, all these things go to make the farms profitable and with the presence of the cow adding to the fertilizing of the farms. Science coming in in every direction adding to the wealth of the farmer. It was asked I think in the address of welcome, if you knew of any farmer in bankruptcy. I want to say that the farmers of to-day do not know what it is to be bankrupt. The farmers do not know that there has been a panic at all. The money is coming in just as steadily to-day as it ever has. The drought may have interfered with you as it did with us. But that is a dispensation of Providence.

I think wherever you find the dairy solidly entrenched you will find men inquiring into the source of knowledge, for this is a larger question than most men are willing to acknowledge. It involves the mysteries of life. The cow is a mother. Don't you believe that bovine motherhood is just as intricate and just as mysterious as human motherhood? A farmer who deals with this bovine mother and undertakes to make money from her motherhood, indeed sells the product of her motherhood, shall he not come to this question with a large degree of thought and study? If he don't that mother denies him the blessing of her motherhood. And here we again come back to this question of science: science shows us the different constituents of food. Shall a farmer say "I don't understand these things?" All he has to understand or learn is the name of the thing and its meaning. You and I my friends who don't pretend to any scientific knowledge, had to learn the meaning of the word "telegraph," we had to learn the meaning of the word telephone. Do you know of any farmer in the country that refused to understand the meaning of the word "telegraph" because he could not understand the science of telegraphy. The three words which represent the muscle and nerve supporting power of food are nitrogen, albumen and protein. I have had men say to me, "I can't understand these things, they belong to books" They can; they have got to learn these things and very soon they will be easy tripping words on their tongues. Now the science of feeding is coming to hand. Questions are coming to me by the wholesale, questions I cannot answer. The question is often asked of me, "How can I feed my cows to better profit?" I want to say one word right here. I wish every farmer would come to the conclusion to produce more dairy food for his cows than he is doing. You have a good soil and good climate. You may not be able to produce corn as well as in southern Wisconsin, but you can produce some varieties of corn and you can produce the finest butter food on earth, oats and peas. The problem is just the same with you as it is with other men and last year many had silos for peas and oats on one side and corn silage on the other. I think that the cows preferred their pea and oat silage to the corn silage, and I know they produced at the lowest rate of cost. The bills for bran and meal were not more than one-third what they were last year and the owner put the two-thirds in his pocket with an evident sense of satisfaction. I know the problem is just the same in Maine as in

Wisconsin. I believe you can with great profit begin to study this question and produce this protein food for the cow. You will do it, you will be obliged to do it You will buy less cotton-seed meal, you will buy less bran and then we can all buy it cheaper. In the hundred patrons we have I have induced twenty to produce more peas. Do you know what the opposition to it was? Can't grow peas. I talked to-day to one Maine farmer and he said, "We can't grow clover here in Maine." Then I told him they do grow it down here on the Experiment Station farm. So I will tell you one thing; it don't pay to be opposed to more than we are in favor of. When a man says can't to me I have got to be pretty thoroughly convinced of the can't. I want to see more study along these lines. I wish every farmer and every dairyman would send at once and get Prof. Stewart's book on Feeding Animals and study the work and get an idea of the principles contained therein.

I thank you for listening to me in this little rambling talk and hope to do better by you to-morrow.

*Ques.* Is the silo needed in raising crops of oats and peas?

*Ans.* Not in raising them but in storing them. It is a convenient and safe method of storing up fodder in its most succulent and nutritious form You are famous for producing fine apples in Maine. Suppose a man picks up a beautiful Maine Baldwin and tastes it when at its very height as a succulent, delicious fruit, and then suppose he pares and quarters that apple and dries it, is there no difference in the palatability and the satisfaction and the nutrition of the two? Does that not illustrate very much the question of feed for the cow? You and I know that the apple loses a very large proportion of its flavor and value by drying it.

*Ques.* Do you run this through a cutter?

*Ans.* Yes, sir, for the reason I would about as soon fork out so much wire. If you pack it in there without cutting, it is a vexatious piece of business to get it out. When run through the cutter it comes out nicely. That is your protein food that the cow needs so much.

*Ques.* In covering a silo do you use a dry mulch?

*Ans.* Do you have what they call swale hay? It is the best covering I have ever seen for a silo, green swale hay put on about two or two and a half feet thick. If you choose you can throw on some boards but it is not necessary. It will settle down together

but if you allow the fodder to stand without any covering you will lose about a foot on the top and you don't want to lose that.

*Ques.* Which is the best to raise, peas or corn?

*Ans.* I would like to raise both. A corn feed is one of the best things we have for the dairy

*Ques.* Do you raise corn here fairly well?

*Ans.* I have never failed to raise a good fair crop of corn here in Maine.

*Ques.* You are troubled with early frosts when you get north?

*Rem.* Not very much, if we get our corn in about the 20th of May we are sure to escape it. I plant the King Philip corn, long ears, eight rows.

That makes a splendid silo corn I know. I think you can take a corn that grows one hundred bushels of ears to the acre and it will give you fifteen or twenty tons of ensilage to the acre.

*Ques.* If it is to be used for cows would you plant it for any other purpose than ensilage?

*Ans.* No. because I want to get all the corn. The ears grow smaller and there are lots of them and they make a strong ensilage.

*Ques.* Which would you consider the best, peas or corn?

*Ans.* Neither one has a right to be compared with the other. They are entirely different.

*Ques.* The trouble with me is my ensilage freezes so badly it gives my cows the ague to eat it. Having suffered thirty years with the ague myself I know how to pity them.

*Ans.* Put up a row of inch strips on the out siding against each studding, right over this put paper, then another row of strips and another row of paper forming two dead air chambers. If you would do that and over that put another that makes three dead air chambers, then on the inside board it up and then put paper over that and the sheathing on the inside laid horizontal. That makes four dead air chambers and I will almost guarantee it won't freeze.

*Rem* This silo is built out doors, mine is in my barn.

*Ans.* You get a greater immunity from cold with these dead air chambers than you would if you shingled four times double. The temperature does not go forty below zero does it?

*Rem.* Not very often.

It does in Wisconsin. I have never seen a silo freeze when constructed in this way, but when constructed with only one air chamber I have seen it freeze. When constructed of solid stone I have

seen it freeze. A wooden silo made with cheap building paper as I have told you, prevents the radiation of the heat and preserves it.

*Ques.* Would you feed cows on this pea and corn silage without hay?

*Ans.* No, I want to feed hay or dry corn stalks. I would want, if I had pea silage and corn silage, to feed a thousand pound cow thirty pounds of corn silage, about ten pounds pea silage and about five pounds of hay as a day's ration. If I had pea silage and good rich corn silage I would add about six pounds of bran. Ordinary dairymen, feeding as they do, give from eight to twelve pounds of corn a day. It is very often that they feed as much as that. What is the average ration of cotton-seed meal here with you?

*Rem.* About two quarts, I think.

How much does that weigh?

*Rem.* About three pounds.

How much bran?

*Rem.* Two quarts of bran and two quarts of corn meal.

About a seven pound ration. With good pea silage and corn silage I think you can get just as much milk from a cow and reduce this ration to about six pounds of bran.

*Ques.* How about the cream?

*Ans.* Just as much, it is the cream I am after.

*Ques.* Some dairymen have the idea that silage has a bad effect on the butter.

*Ans.* It has a great deal worse effect with us where there is none. The Hoard creameries furnish butter to 3,200 customers in Chicago. Can you imagine a more critical market? You take hold once and answer the thousand and one complaints of these people and see if you can have a more critical market? Yet not one ever complained of any lack of flavor or bad flavor in our butter. We have somewhere between sixty and eighty silos in the milk that goes into these creameries. I have found a few people who are prejudiced against it, but prejudice is not reason, and I think there will come a day when they will cease their opposition. I notice one thing with silage milk, it churns more exhaustively than any other, there is less waste, less loss in cream. It has some such effect as when we turn the cows out on June grass. You know how soon the first croppage of grass improves the flavor of the milk.

*Ques.* What do you know of gluten meal?

*Ans.* I know it is a good feed. It is the chit of the kernel of corn.

*Ques.* What do they take out of the corn?

*Ans.* The starch and sugar. Then they leave the protein or albuminous portion of the corn. That is the chit. That is what is left.

*Ques.* How does that compare pound for pound with cotton-seed?

*Ans.* Cotton-seed, I think, analyses about thirty-six, corn meal, eighteen, cream gluten meal twenty-four, it is less than cotton-seed.

*Ques.* Do you prefer it to corn meal?

*Ans.* Yes, if I want to balance up the protein side of my ration. If it is very cold weather I would give my cows a little more corn meal to warm up.

*Ques.* Most of the farmers here are small farmers. If you have a silo do you want the corn and oats in the same silo?

*Ans.* No, not unless I get it in together, which I can hardly ever do because the season is different

*Ques.* I would like to ask you whether feeding for milk and feeding for cream are different things?

*Ans.* Cream is a misleading term. Cream is composed of butter fat and caseine. Caseine I don't want at all, I take it out. No man can feed for butter fat alone. No man can feed for caseine alone. Milk is produced by the cow for her offspring. If you put yourself in the place of the calf it does not change the purpose of the cow at all. We must be governed by the physical law which underlies this milk production. This is the most perfect food that is produced. We must feed a balanced ration, because we are to produce a balanced food. Milk is composed of caseine 3 1-2 parts, fat about 4. milk sugar 4.7. Caseine is a very important part, almost pure albuminoid, almost pure protein, almost as pure as an egg. The cow must have something to get this from. She cannot put it in her milk unless she has some source to draw from. You must feed a strongly albuminoid ration for two reasons. First, for the cow to put in her milk; second, the cow in producing milk is drawing heavily upon her nervous system. No function of the animal creation so largely exhausts the nervous force as does the function of producing milk. The ox, traveling all day with the plow, does not tax his nervous system as much as a cow that produces a pound of butter and accompanying solids.

The brain and the spinal cord are the great nervous batteries of the body. They supply the nerves with all their force. They have got to be supplied by a nerve supporting food. What is that food? It is an albuminoid; that is the only food the nerves take for their support. So you see you must feed the cow a highly albuminoid ration for the support of her nervous system.

Here lies the physiological question, the science of it. This is the reason why we come to this conclusion that we must seek a protein food such as pea meal, oil meal, cotton-seed meal, etc. Clover is another one of those things which are largely endowed with nitrogen, or what is the same thing, protein.

*Ques.* Is there no rule for feeding for cream or milk, or varying the quality or kind, to produce one and not the other?

*Ans.* I never could load my gun so as to hit if it was deer and miss if it was a calf. Richness of milk is a breed characteristic, an individual characteristic. You will find individuals among scrubs giving rich milk. I believe there is a trace of truth in the fact that you can feed a cow that has a large limit of butter fat up to that limit. What I mean is this: suppose my cow, Bonny Belle, a Guernsey, has 6½ per cent butter fat limit. She was a two-year-old heifer and gave me that. She has, say, a 4 per cent limit of caseine and a 4.80 per cent of milk sugar. That is a maximum limit of milk solids we will say. Now I can take that cow and stretch her up to her natural limit but beyond that I don't believe any man can go with any feed. Lots of cows have never been fed to their constitutional limit. It will pay any man well to find out what that is.

*Ques.* In other words if you desire production of cream look to the breed, not to the feed.

*Ans.* If you desire moderately rich milk for market you would also look to breed

*Ques.* You would look for a specific cow to feed for fat?

*Ans.* Certainly, I want my specific cow for a specific purpose, butter fat. Milk for market does not require as much fat as milk for butter making. We see here the great law of individuality. When the Jersey islanders desired to breed for butter and establish a butter breed they kept selecting the richest cows and bred them to the sons of richest cows until they established butter fat individuality as a breed characteristic. Just so with the Guernseys. The Hollanders took the cows giving the largest quantity and bred them

for 1,000 years to the sons of like cows. They established a breed characteristic for quantity. All that feed does is to stimulate and support the individuality and breed characteristic. If the cow is doing work below her natural limit of proportion in solids which I believe she often does do, stimulating butter food may bring her up to her proper proportion or limit of milk solids but beyond that, I do not believe feed can go. If it could we might easily change a Holstein cow over into a Jersey and *vice versa*.

## DAIRYING FROM THE BUSINESS STANDPOINT.

By Dr. GEORGE AUSTIN BOWEN, Woodstock, Conn.

*Mr. Chairman, Ladies and Gentlemen:* I am exceedingly glad to meet with the dairymen of Maine and talk with you this evening on, not the physiological points of dairying, but upon its strongest feature and one that I know will appeal to you all, the business character of it. Columella, that ancient Latin worthy whose writings on farming sound as pessimistic as those of any modern agricultural writer, expressed these words, "*Caput est in omni negotio, nose quid agendam sit.*" The most important part of any business is to know what ought to be done,—and he should have added, have wisdom enough to go ahead and do it. That unclassical but very American character, Dave Crocket, tersely modified and extended the Latin author's thought by advising: "Be sure you are right, then go ahead." My part in this business feature of dairying is to show the right, to turn on the searchlight of truth; yours to go ahead and accept it. I alone cannot bring you prosperity and happiness as dairymen, it can only come in this matter as in all others by your own action, grasping with energy and enthusiasm new facts and thoughts, and pushing them to a frontage in your avocation. Personally we may not agree upon everything I shall present here to-night. We don't always find that the audience and speaker agree, but if we can find one or two little points, we may inquire still further and possibly find we do concur upon many. But there is one point I know that every man and every woman in this audience will agree with me upon, and that is the best authority in the dairy business. It is not Gov. Hoard, who spoke so eloquently to you this afternoon; it is not any of the

professors in your college, as learned as they may be; it is not myself. The best authority in the dairy business is the *almighty dollar* and the man that can make it clink the loudest has the best authority for his opinions. I think we will agree upon that, and it is upon that point that I desire to speak this evening; the business point of dairying.

Last year I had the honor and pleasure of addressing an audience of Maine farmers, and I said to them that dairying was the best business carried on in the United States without a single qualification considering the amount of capital employed. I said it was better than politics, and better than preaching, and it paid as well as railroading. I don't pretend to be a prophet but have not events carried me out in that statement? Where is the politician in this great upheaval in politics, and where is the business man? No one can tell the foundation he rests upon to-day but the farmer as you have heard stated here to-day has not yet felt the hard times, he only knows it by the reports that come to him through the newspapers. If you should ask him with regard to the hard times he would say that there are none. So I say emphatically we are in the full tide of prosperity with a good business; and one that is capable of being carried to a still greater extent, if we will only give a push to it, and adopt the improved methods of dairying and will carry them out in all their details Farmers are a hard class to convince. Grown up without the contact of others, with an environment that is ever the same, they are apt to get into ruts and it is hard work to step out of them. Sometimes I think that a farmer cannot get out of ruts until he is either "yanked" out or lifted bodily out, and put in some position where he is forced to be aggressive. But agriculture is looking up through the whole line. Uncle Sam has recognized it and is giving thousands of dollars every year for experiment stations, your State and mine as well as all the other states are seeing the benefit of it to-day. To these stations we owe a great deal for the advanced ideas and advanced thoughts, and to the leading dairymen of the country,—that we can count on the fingers of our two hands—we certainly owe a great debt of gratitude. When we look at the business features of dairying we find the first is the dairyman himself. Is he ready to take these advanced ideas and accept them as gospel truth or at least accept them so far as to endeavor to carry them out on his own farm? We see here and there inquiring minds. I received a

few days ago a letter that was almost unintelligible from the scrawl it was written in and by the language in which it was couched. Accompanying the letter was a specimen of clover and I was asked to name it. The individual stating that he had found it growing beside the railroad track. He had watched it several weeks and found it withstood the frosts, so wanted to know the name of it, he wanted to put in several acres of it another season if it was worth anything as he believed it to be. I found he was a German, which accounted for his bad English, possibly a man of little education as we could judge by the handwriting. Not being able to name this readily, I sent it to the Agricultural College with the statement that I had found a progressive man; one who, when he saw this little bunch of clover growing, possessed a desire to know more of it. He did not pass it by as many of us would, but watched it from day to day, and finally sent it away seeking for further information. I have hopes for a man who will try to advance in that way. If we will all keep that idea bright, of seizing upon every particular that is offered us we certainly shall progress in time. I have faith that the farmers of Maine will appreciate the advance science has made. That they will take it not only to heart but to practice, and we shall find New England coming up in the dairy interest as I believe she is capable of, and assuming a leading position second to none in these great United States. Soil and climate and water, those great essentials, are nowhere better than they are just here. If we find the dairyman ready to progress as science is trying to help him, we must look a little at his farm, his stock, and see what we have there. We find that the barns of New England are not what they should be as dairy barns. They are built on the old idea. They are not expensive structures, I don't know as they have any great qualifications any way, excepting that they do give shelter to stock, and most of them give too much shelter, that is, they are shut in so close as to render the physical condition of the stock far below what it should be; hence we have tuberculosis breaking out here and there throughout the country. It is the great dread of dairymen to-day and the great scourge of our New England farms. They say you must build several times before you are satisfied with a house, and I believe it is so with a barn. I believe we shall see a radical change as time progresses, in the building of barns. We shall find that the silo occupies a prominent position. That we shall not

only construct with regard to the storage of food in that way, but for new foods which I believe science is yet to bring out and develop for the dairyman. The United States government have already undertaken experiments with quite a number of foliage plants and I believe that from them we shall yet receive great advantages, and that we shall construct our barns and harvest crops in manners that are now unknown to us. Beyond the barn, beyond the dairyman, beyond the farm, comes the stock. There is the great essential, the great business point of the dairyman. We shall find as we progress in the study of the animal that we have been pursuing false courses, and as a consequence the reaction has come back to us, and is telling in our pocket-books. The condition of the farm is the condition of the man. For show me a farm and I will tell you the character of the man that occupies it, show me a section of country and I will show you the character of the people that till it. It is said that people who live in a hilly country love their homes and are more devoted to it than people who live on the plains. I believe it, I believe that our conditions are created by our surroundings, I know that the New England farmer is created by the conditions of his farm. We have been led to think that almost any sort of a cow was good enough to breed from, to milk, and to keep upon our farms, and we have to dispel that idea and take a more modern one, that the dairy cow is a specific cow, bred for a specific purpose, and we can no more get away from that purpose than we can in the horse that is bred for the race or for draft as the case may be.

We have to go to another business point, and must accept the idea that here in New England, we are to have every few years just such a summer as we have had the past season, namely, an excessive and prolonged drouth. We shall find our pastures drying up, and streams and springs shrinking, and with that shrinkage comes a shrinkage of the milk flow; we must learn from history, because history has taught us this away back from the time that the Puritan landed, we have seen these summers coming once in about so often, and must take advantage of that knowledge and provide against that drought as I know we can, and every good dairyman must, if he will succeed and make a business that cannot be controvened by nature. I once heard of a man who lived in the city and moved out into the country to work a farm. After a year or two he went back to his old home. His friends asked him why it

was he deserted the farm and come back into the city. He said "I intend to embark in a business God Almighty has not so much control over." I think if we take that idea, if we will control our own farms and provide against the time of drought, we shall be looking at that question from a purely business standpoint, and when we find the drought of the summer has reduced the hay supply for at least a year, we shall have on our hands sufficient food to last until another spring sends forth verdure again for the sustenance of our herds. So we find the dairy farmer must plan his business to dissipate the drought, putting in his crop of corn for ensilage, putting in his peas and oats to be treated in the same way, supplementing natural grasses with cultivated crops which better withstand a dry season.

I desire to speak on the subject of feeding, in furtherance of the idea of soiling. We have yet to study these points more carefully, more closely to adapt our farms to them. We can easily do it, and we shall see immense results from it, not only in the summer time, but in the winter, by the better condition in which the cattle will enter that season. We must also consider not only the hay supply but the substitutes therefor, putting in crops that will take their place in winter and carry out the idea that we will make them better yet by giving a grain ration; and then understanding what that grain ration shall be. This is one of the intricate questions, and one that is coming more prominently before us day after day. The combination of a grain ration. It is a business question, give it due thought and study, it will yield a corresponding profit.

There is another feature beyond this that is of value to the farmer that is brought out under this system of feeding. The value of the manure as produced by a grain ration. I have seen that practiced on my own farm, for I was so unfortunate when I went back to the farm from the city, to find the twenty-five years of absence from it, had depleted it by crops taken from it every year through the process of letting. It was worse than the ordinary New England farm, it was a run down, a let and sublet New England farm. It was my purpose to restore that fertility. I went at it with one maxim in my mind and that was, the fertility of the soil is the capital stock of the farm. How should I bring back that fertility? I hadn't the means or the education to undertake to restore it by chemical fertilizers alone, I knew that experience must go with that, and in that point I was exceedingly lacking. I had a belief

in the physiological action of feeds; I knew I could overstock that farm; that I could substitute for the hay which it ought to grow; that I could bring the grain on to the farm; that I could increase the value of the compost heap, and I had the heart to do it. It was discouraging work at the outset, but I undertook it, and field after field was restored to fertility, I was liberal in my ideas and to-day my little Connecticut farm—it is only a small one—will rank as well as my neighbors', and better than one or two of them. I am not ashamed of the crops I grow there. We have solved the problem to our own satisfaction that there is money in a liberal feed, a liberal feed to land and a liberal feed to cattle. I wish that we had here a blackboard that I might place upon it a little detail that I desire to show. I find in one of the recent bulletins of the New Jersey Experiment Station a series of tables showing the value of certain feeds on the farm, and the value of grains as they are used. Let us just briefly glance over these, or at one or two of the leading items.

FERTILITY IN FEEDS.

"The buying of concentrated feeds should also be studied from the standpoint of fertility, the main elements of which are nitrogen, phosphoric acid and potash; these through the agency of plants are converted into products which have a fertilizing value, regardless of market price; that is, if corn, oats, wheat, or hay are returned to the land, they will aid in the growth of other plants by virtue of the manurial elements contained in them. The average amounts of these constituents in the four principal farm crops are shown in,

TABLE I.

| | Pounds per ton of Nitrogen. | Pounds per ton of Phosphoric Acid. | Pounds per ton of Potash. |
|---|---|---|---|
| Wheat | 38 | 20 | 11 |
| Oats | 37 | 15 | 12 |
| Corn | 33 | 12 | 7 |
| Timothy hay | 20 | 7 | 26 |

"These amounts per ton of fertilizer constituents are removed from the farm when the grain and hay are sold. When feeds are bought it is important to know whether anything is gained in fertility by the exchange, for under equivalent conditions of feeding the same relative amounts of fertilizer constituents are retained in

the animal products. Table II shows the amount of fertilizer constituents contained in the more concentrated feeds.

TABLE II.

| | Pounds per ton of Nitrogen. | Pounds per ton of Phosphoric Acid. | Pounds per ton of Potash. |
|---|---|---|---|
| Cotton-seed meal | 139 | 65 | 38 |
| Linseed meal | 109 | 42 | 29 |
| Gluten feed | 76 | 8 | 1 |
| Malt sprouts | 88 | 33 | 37 |
| Buckwheat middlings | 80 | 43 | 23 |
| Dried brewers' grains | 77 | 19 | 2 |
| Wheat middlings | 56 | 42 | 21 |
| Wheat bran | 50 | 60 | 31 |

"It is observed that all of these feeds greatly exceed the grain and hay in nitrogen, and with the exception of gluten feed and dried brewers' grains, the mineral constituents are also in considerable excess. When market prices are such as to make the exchange of farm produce for commercial feeds a judicious proceeding from the feed standpoint, the inevitable result will be a decided gain to the farm in fertility. Farmers of this State spend $1,500,000 annually for these identical constituents of fertility in the shape of commercial fertilizers, and many thousands of dollars more for city stable manure. These facts furnish sufficient evidence that an increased fertility is desired. A closer attention to this matter of manurial values in feeds would either materially reduce the expense now incurred in these directions, or secure a greater increase in fertility at the same expense, for the market prices of feeds are not influenced by manurial values.

"This matter cannot be urged too strongly, particularly where fertility must be imported to the farms in order that maximum crops may be secured. In our exports of linseed meal, and in the bran and middlings contained in the whole wheat exported, farmers in other countries are now given annually an amount of fertility that would cost us, if bought in other forms, not less than $16,000,000. This amount of fertility, gathered largely from the rich stores of our Western States, should be retained for the less fertile lands of the East. It will be retained only when farmers have learned to apply more fully those principles which govern the economical use

of fodders and feeds, the results of which are a saving of food and of fertility. Finished farm products only should be exported."

The Cornell University Experiment Station gives in Bulletin 56 the following table which read in connection with the foregoing makes a complete whole, showing at a glance the business side of feeding a dairy herd; improving the farm and the bank account by the same operation.

FERTILIZER VALUE OF FOODS.

| | Value of nitrogen in one ton. | Value of phosphoric acid in one ton. | Value of potash in one ton. | Total value per ton. |
|---|---|---|---|---|
| Corn meal | $4.53 | $0.828 | $0.306 | $5.664 |
| *Corn ensilage | .78 | .144 | .315 | 1.24 |
| Clover hay | 5.70 | .54 | 1.314 | 7.554 |
| Cotton-seed meal | 20.85 | 3.66 | 1.65 | 26.16 |
| Linseed meal | 16.08 | 2.28 | .99 | 19.36 |
| Meat scrap | 29.01 | 6.012 | .666 | 35.688 |
| Oats | 5.355 | .90 | .45 | 6.70 |
| Skimmed milk | 1.74 | .26 | 1.08 | 2.108 |
| *Timothy hay | 3.00 | .432 | 1.17 | 4.60 |
| Wheat bran | 7.56 | 3.40 | 1.341 | 12.301 |
| Wheat straw | .81 | .30 | 1.017 | 2.127 |

* Values calculated from analyses given in Fifth and Seventh Annual Reports of N. J. Experiment Station.

Isn't that the right method of restoring fertility to our lands and can't we all take hold of it as dairymen, capable as most of us are, and buy these concentrated foods? We are not throwing it away, we are getting a double value for it, we are filling our bank account first, by the milk produce, whatever way we may use that, and we are restoring the fertility of our lands. We are bringing up our farms to that idea which I have expressed, that the fertility of the soil is the capital stock of the farmer. Surely we can take heart from that and we can expend our money with the idea that we are bringing back double almost its value as it cost us. There is business in that, there is business in good feeding, not only of our cattle but of our lands. With regard to the cattle I desire to speak a few moments. We will go over it briefly. I have said that the dairy cow must be a specific cow, bred for one specific purpose. This afternoon as I went down stairs I passed behind one of your Maine farmers, a strong, rugged fellow with a good, intelligent face, and I heard him exclaim as he went down with his friend, that

he "didn't care a damn for pedigree" and gave some further very emphatic expressions with regard to it; and it struck me that there was a young dairyman, who was on the wrong track, and I thought I ought to start him right, but how could I do it? It was not the proper time. I have learned that the only time to talk to an individual is at the right time, if you wish to make a convert. Josh Billings said, "The best time to set a hen is when she wants to set," and the best time to convert a man is not when he needs to be converted but when he wants it himself. Therefore I went home to my hotel—my home has been in hotels a great deal lately —and prepared a few pedigrees with the hope that I could convert some one to my idea of pedigree as a business point. Now I think if most of you will look over your herd as we talk more of the dairy cow, you will conclude that you have poor cows and will be desirous of weeding them out. Not only weeding them out, but breeding them out. That is the reason I talk pedigree.

You all know that a Shorthorn is one of the most majestic animals that walks the earth. That magnificent animal was brought up from a very obscure origin by judicious breeding through the selecting of one great law in breeding, that of heredity. Those who created that breed followed the great law that like begets like, and also that other law of change or variation. These are the laws that underlie the whole animal creation. There is the Ayrshire. You all know what a beautiful creature the Ayrshire cow is. How did she come into existence? By crossing certain breeds until certain conditions were evolved, and strengthening those conditions from time to time by inbreeding. Now if you should bring two Shorthorns together the result would be another Shorthorn, and if you should bring two Ayrshires together the result would be another Ayrshire. Suppose you should bring these two together the result would be a cross-bred animal with one-half of each in its composition. Is there a man in this audience that could predict just what this animal would be and what its milk qualities would be? Here you have an essentially beef animal and here you have an essentially dairy animal, you would get here in all probability an animal that would perhaps excel in its growing conditions the young of the Shorthorn and you would get perhaps an animal that would excel in its milk production. Suppose you should keep on breeding and get another animal and cross these two, what would be the result? You would have still a half breed Shorthorn

and a half breed Ayrshire. There would be just equal parts of the blood element of each animal.

(Here with the aid of the chart, was shown what the result would be if these breeds were crossed with the Jersey, "the old black cow," etc., and the effect of breeding cross-bred animals, illustrating that the dominant law of heredity grows weaker in each successive cross, finally giving way to the law of variation, and instead of the certainty of breeding desirable characteristics, we can only expect different ones.)

Let me call your attention to the pedigree of one of my own mares. If you take a mare like that, bred as she is bred, and breed her, you would say every time, it makes no difference to what horse she traces, or what horse she takes after, I shall get a racer. I shall receive a horse that has endurance, that has nerve, courage, and you would take that animal and would be willing to pay a price for it. It would be just the same if you could substitute here cattle that had a pedigree, that has a record of so many pounds of milk and so many pounds of butter, you can easily see that there is a commercial value in a pedigree of that kind. It is not a mere matter of fancy, but it shows dollars every time it comes back to the sixteen pound cow, it shows dollars every time it comes back to the twenty-two pound cow. A man should take the pedigree of his stock and study it well and if he finds there is good material back of it it is best to keep it, if he finds it is inferior he must weed it out and we must all be not only good dairymen but good agriculturists to understand that word "weed." It applies not only to the garden but to the stable and cattle as well as everything else on the farm. So we see there is an actual money value in pedigree. We shall find that the man who will study it and will take a pedigree bull and place that animal at the head of his herd, will in time build it up and will strengthen every animal therein. If he will take the offspring of that animal and breed them back to him fixing his type on the second generation of calves and going still further search for a pedigree rich in milk production and breed these cows on that second animal he will find he has indeed struck a mine of wealth. I am aware that I must not talk pedigree too long. I must not weary you, yet if you will pursue this idea still further in your discussions you will, I think, bring out the fact that there is money in the farm.

That there is money in dairying and that here in New England we are as well situated as any farmer in the land to carry on this business. What we have to do is to make a start. the time to make a start is now. You can make it with your present herds. You can make it as Mr. Weeks taught you last winter at Brunswick. that was one of the most practical exemplifications of weeding out a herd I ever met with. I am indebted to Maine for a good many things, that is one of them. If you will take the transactions of the Maine State Board of Agriculture of last year you will see the whole of that magnificent table given. By the use of the Babcock Tester Mr. Weeks sifted out his herd, testing each one, each week during the season. It was carrying out the details of the business. If you will go into any avocation you will find that there are three fundamental rules to carry out. First; attention to detail. Second; thoroughness of detail. Third; close attention to detail. If you will carry this out in your stables this winter; if you will plan your business as systematically as the merchant in Boston plans his and carry it out not only individually but in cooperation with your neighbors running creameries together, running cheese factories together, you will find there is money in dairying and money on the farm. If we have faith in our business we can amplify it in any direction, almost. We shall find that science is ready to aid and encourage us. I trust the time is coming when this good state of Maine will produce as good butter and as good cheese and as much condensed milk as any state in the Union. It has the capacity for it, it has the men, if they will take hold of it in a business like way and give it the attention it needs.

Gov. HOARD. You say you heard a young man say that he did'nt care an Amster-dam for pedigree. Do you believe that that mare you possess would have arrived at the embodiment of all splendid perfection she has if she had been bred and that her ancestors had been bred by a man who would not give an Amsterdam for pedigree? What does our friend mean when he says he would not give anything for pedigree, do you really understand what he means?

*Ans.* That is a pretty hard question to answer. When a man makes such an expression as that he shows that he is not up in his profession as we term it. He fails to recognize the great essential of breeding. He gave himself away as a poor farmer, a poor breeder, and as a man who does not read, and as a man who

does not believe in his vocation. That is the only way I can express myself in regard to him. A man that breeds from one of these animals believes in pedigree, and breeds according to performance. Why can't we as dairymen breed to performance, breed from the best animals, and every time we shall get a little better animal. There is no chance in that. We can't afford to take chances, we must breed to a certainty. Human life is too short to go into all of these vagaries of wishing and hoping that good results may come from bad actions. I was taught better than that when I was a boy, that was a part of my bringing up.

Mr. SMILEY. Can I ask you one question? As I understand it you have been illustrating that farmers must do certain things to get a proper herd of dairy cows for butter. My question is must they do the same thing to produce a herd of cows for making cheese, or can we make butter and cheese both from the same herd of cows?

*Ans.* That is a good practical question and one that is being asked all over the country. We find that if we want to make the best butter and the most butter from a given quantity of milk we must breed a cow for that purpose. If you want to bring the most cheese from a quantity of milk we must take a cow that has been selected and selected back generation after generation, for her cheese qualities I believe that we can increase the caseine in our milk by breeding cattle noted for giving extra quantities of it. I believe we can breed our cows to give extra quantities of butter fat by breeding those that possess that peculiarity. When we expect to have a cow that will give first quality of cream and first quality of caseine and you can switch off the caseine stock whenever you wish and switch on the butter fat whenever you wish you will find that you have two cows in one and you will find that that never will be produced.

*Ques.* Is there any difference in the quality of caseine in these cows, will one make a better cheese than another?

*Ans.* We have been told that cream is cream and caseine is caseine. There are certain other qualities in the milk that may affect the cream. I believe it is more in the manipulation than in the quality of the caseine.

*Ques.* Is there any animal that we can go to to-day to fill up our herd that is a good butter breed that is not a good cheese breed, or that is a good cheese breed and is not a good butter breed?

*Ans.* I believe the Columbian Board found that the Jersey cow is the best butter cow and the best cheese cow. Wherever you find certain class of animals you will find certain qualities of its milk. There are cattle that have been bred for cheese as the Ayrshire, and I think from a given quantity of milk you will get a greater quantity of cheese from the Ayrshire, take them as a whole, than you will from any other breed.

Gov. HOARD. You will certainly get as large a quantity of cheese whether you do of cream or not.

*Ans.* Perhaps that is the best way of putting it. But as a general thing a good butter cow is a good cheese cow.

## REMARKS MADE BY HON. W. D. HOARD AFTER TALK BY DR. BOWEN.

I am very much interested in this matter. It seems to me if we could only get the average farmer of this country to estimate the value of good blood it would have wonderful effect on his fortunes. I know that all over this country are lots of good hunters. Farmers who are good fox hunters. But you never heard one say that he didn't care a continental for the pedigree if he wanted a good fox hound. You never catch him out with a bulldog. You let a man get interested in trotting, he thinks he is going to raise a trotter; you never hear him say he cares nothing for blood if he is trying to breed a trotter. But when it comes to cows, he is willing to shut his eyes and trust to chance or anything else; he will say he "don't care a continental for pedigree."

I want to ask this audience one question. I remember seeing Phil Sheriden coming down the Strousburg Pike when that terrible battle of Cedar Creek was fought and the fate of this nation hung in a balance, twenty miles from Winchester and that horse Rienzi was "swallowing the ground with rage," with a stride that did not flinch at twenty miles at all, carrying gallant little Phil on his back. What would have been the fate of the United States government but for that wonderful animal, bred by man for two thousand years for a special purpose to save the nation that day? Where would this country have been if Phil Sheridan had mounted a scrub and gone down to meet Early? Where would this nation have been, what would the fate of that battle have been if the men

who bred that horse had not cared more than a continental for pedigree.

I know myself the value of a good horse. I was mounted once on a two mile and repeat mare that we had captured. The captain said I might have her if I would take care of her. She was a born woman with a heart in her just as feminine and kind as could be, and full of indignation when she had been badly treated. She was quite ugly to strangers. I threw her on the ground by the aid of two men. She would get on her feet and I would wait till she was within two feet of me, full of rage, when I would raise my hands, the boys would pull the ropes and over she would go. I would go to her and tell her she was foolish to resist me, that I was irresistible, I would not be denied, she must accept me as her master. I worked with her till they threw her thirty times. Rarey says there are three dominant things in the horse's m nd all of which are indicated by the movement of the ears. When a horse is angry the ears are laid back, when a horse is frightened the ears stand erect, and when a horse reasons and thinks and investigates the ears come forward. You never saw a horse smell of anything that she didn't throw her ears forward. He says wait for the ears to come forward; wait for the uprising of reason in the horse's mind. So I waited for my answer. Finally she came to her feet struggling, nearly exhausted, her ears tipped forward as much as to say, "Oh dear, what manner of man is this?" I knew I had her. I stepped up and put my hand over her nostrils, stroked her down, gave her a little grass from my hands, turned, and she followed me into the barn and during the service she was a devoted lover of mine. I was as proud of her love as could be, it was to me and me only. Once when on a scout a rebel lieutenant and twelve men sprang from behind a clump of cedars, with "Surrender, you Yankee." Well, anyway, it was not a very proud pedigree. And thirteen carbines went off in every direction. I laid down on Susan and said, metaphorically speaking, "If you love me get out of here." We sped down the road on the pike, the pace was terrific. The lieutenant was nearly as well mounted as I, but the men soon fell in the rear.

The wonderful speed, the immense stroke, the strength, the wonderful combination of power, two thousand years lay in that stroke from El Hasson, the Arabian of to-day. Down the pike for two miles, the lieutenant st ll following, it was blood that was coming to the fore. By and by I was out of the reach of the lieu-

tenant. Afterward I fell in with a Virginian, a lieutenant, a member of the Fourth Virginia Cavalry and a prisoner, a whole-souled man as ever I saw. We talked quite a good deal and finally he told me how he was captured at Cedar Creek. He told me about once chasing a battery soldier down a Virginia pike and he said "He was mounted for God's sake." I should like to know where that fellow got his horse. My heart was in my throat. I reached out my hand and said, "Shake." He said, "Why?" I said, "I was the huckleberry you was after that day." The tears came in his eyes as he grasped my hand and he said, "Thank God I didn't hit you" He said, "Where did you get that horse?" I said, "I don't know, she was picked up by the scouts. I heard she was a two mile and repeat mare." He said, "I know that mare; I thought I knew her that day when I first saw her fly."

Gentlemen, you who are raising cattle for a specific purpose, you who are embarking your all in the dairy business can you afford to be mounted on a scrub in this race of business life? Put good blood under you.

## THE BUSINESS SIDE OF THE BABCOCK TEST.

By Prof. W. H. JORDAN, Orono.

The manufacture of butter at either co-operative or private creameries has developed in Maine within the last fifteen years from a small beginning to an industry of considerable magnitude and importance. One by one factories have sprung up in our midst, some to fail through misfortune or mismanagement, but nearly all to go foward to permanent success.

The method of securing the cream for these factories has almost entirely been the so called "cream-gathering system." Recently factories are being established to which milk and not cream is being taken. In the cream gathering system as first instituted, the cream was raised at home by the various patrons, in a majority of cases perhaps by the deep cold setting process, in cans eight inches in diameter, was measured in inches, collected and taken to the factory by paid collectors. After the butter was made and sold, each patron received an amount of money which was fixed by the price obtained for the butter, the cost of manufac-

turing the butter and the number of inches of cream which he furnished.

The peculiar factor in this business transaction was that an inch of cream from one patron was considered under all conditions to be exactly the equivalent of an inch of cream from each and every other patron. Even if some suspected this assumption to be false, it was held to be wiser to wink at it as necessary to the continuance of the factory system.

Later, however, the suspicion that paying for cream by the inch was working an injustice to certain patrons and was an unearned source of revenue to others, took on the form of certainty. The observations of those having the management of certain creameries led them to assert that an "inch of cream is not an inch of cream," and a discussion of the question thereupon ensued which created an unrest in some quarters in regard to the existing method of dividing proceeds.

In 1886 the Maine Experiment Station undertook some inquiries with the view of obtaining more exact knowledge as to the variations in value of cream. It was ascertained through correspondence that the methods of raising cream by factory patrons included the cold, deep setting process, setting in a cool cellar, hanging in a deep well, etc.

By actual and repeated experiments at the Station under the most exact conditions, it was found that a variation of 10° to 15° in the temperature at which cream was raised caused a corresponding variation of from 19 per cent to 35 per cent in the amount of fat in a given volume of cream, the warmer temperature always producing the richer cream. Later, in connection with a study of breeds, it was ascertained that breed, individuality and the length of time the cow had been in milk since her last calf are also important factors in determining the richness of cream. Evidently the basis of division of the proceeds of co-operative butter factories was unsound in principle.

I do not wish any one to imply from this statement that I would have prevented the organization of these factories simply because no exactly just plan for the payment of patrons could then be devised. The promoters of butter factories did the State and the farmers of the State good service even though for a time all the business conditions involved in their management were not entirely satisfactory. They secured a new departure in Maine's foremost

agricultural industry that was a necessary condition of progress, and through which Maine dairying has been and will continue to be. advanced to greater and greater success.

Late in the summer of 1890 there was issued from the Wisconsin Experiment Station a bulletin giving the details of a new method for the rapid determination of fat in milk and the products of milk. Somewhat similar methods had previously been proposed, but they had not seemed to find that easy and general application to business dairying that was desirable.

But the Babcock test at once came to the front as one altogether practical and applicable to the conditions under which it must be used. Probably nothing has been done by any experiment station or any individual since the establishment of experiment stations in the country which has given to agriculture such immediate and evident financial aid.

It is a notable instance of the culmination of years of previous scientific work in a simple but grandly useful piece of apparatus. The bulletin to which I have referred closes with this most significant sentence, "The test is not yet patented." I think no single fact better illustrates the beneficence of the Experiment Station than that the dairy industry should receive the aid of such an invention without money and without price.

With a less honorable man, under a less beneficent system the use of this process would have exacted from dairy farmers a royalty that would have yielded an immense fortune to the holders of the patent rights.

In January, 1891, Maine's first dairy institute was held at Winthrop. At that meeting the Babcock test was first explained and illustrated before a Maine audience. It was also then shown how the test bottle of the Babcock machine could be modified to adapt it to testing cream with the same rapidity and accuracy as milk, thus making the test entirely practical for use in the cream gathering system. In the light of two years' experience and progress it is interesting to recall the objections that were raised to the introduction of this test at that time.

Many were afraid that no improvement in accuracy would result, because of the supposed difficulty of obtaining samples that would correctly represent the average composition of a patron's cream. Others were greatly disturbed because the test only gave the percentage of butter fat and not the percentage of butter. Some

were fearful that coöperative dairying could not endure the shock of such a moral search-light as the Babcock test. They were afraid it would not be good policy to proclaim a day of judgment in matters lacteal any more than in matters moral or spiritual. There are always those who fear that some particular business can not be adjusted to the strict lines of just measurements. Such timorous souls would not be too honest, but just honest enough. In fact there were many who for one reason or another, were disinclined to risk the disturbing effect which they prophesied would result from the demonstration of the fact that all inches of cream are not alike in value, and from the introduction of a new basis for the payment of patrons.

Opposition to the test came from unexpected quarters. The accredited representative of a large business firm, engaged in handling dairy supplies, said to me with great earnestness on the day of the Winthrop meeting, "If you don't stop agitating this matter you'll ruin the dairy business in Maine." I do not know whether he was speaking for himself or for the firm he represented, but in either case he proved to be a false prophet, and that very firm is now offering to the public some of the very best forms of the Babcock Machine.

This test is now an important factor in all dairying, both private and coöperative. At the time of the Winthrop meeting but two machines were in the State, now they are used by a majority of our factories and by many private individuals. No well-managed butter factory or large private dairy is without one, for if without one the management falls short of the best,—it is not even well in the sense of being all it should be.

I am sorry to confess that there is still need of urging this advance in dairy work. Some of our butter factories still pay the same price for every inch of cream.

I trust that none are doing what I am told is the practice in certain private factories of another state, viz: The cream is tested. If it falls below a certain standard, the patron is required to furnish better cream or take a diminished price. If it exceeds a certain standard nothing is said,—the patron is none the wiser and none the richer.

Not long ago I visited a Maine butter factory which receives whole milk and uses a separator. The milk is purchased at a uniform price per pound irrespective of quality, unless it is discovered that it is exceptionally poor, when the price is reduced.

Unless I am misinformed, the condensed milk factories of the State know no difference between the 14 per cent solids of the Jersey and the 12 per cent solids of the Holstein. If it were not for the fact that every farmer is honest, what an opportunity for the Jersey man to make a judicious use of the pump handle!

It is not strange that new ideas meet with opposition. They must be understood at least before being received into public confidence. Moreover, a judicious conservatism is a safeguard against error and the disasters attending the acceptance of unsound statements or unwise business methods. But the Babcock test has been given an extended and severe trial both in the laboratory and factory, and has proved itself to be both rapid and accurate, and better than all it can be handled successfully by those who have not received the special training of the chemist. Not only this, it is confessed on all sides that its use has wrought a great improvement in the business methods of butter factories. These being facts, it is hard to understand why any business man or community of farmers should be tardy in availing themselves of its benefits

Does any one now doubt the reliability of this test as a means of determining the quality of milk or cream, or measuring the productiveness of a cow? If so, let me call their attention to the test of dairy cows at the World's Fair.

I am informed by Dr. Babcock, who was a member of the testing committee, that so accurately did the Babcock process measure butter fat to the extent of over 8,000 lbs , both in the milk and in the butter, that the discrepancy between the fat in the daily milk and in the butter was equal to only .15 per cent of the weight of the milk. Prof. Farrington, who was in charge of the chemical work, sends me a statement more in detail. The following figures which I received from him not long since, show the discrepancies in 304 churnings, between the fat in the milk and the fat in the butter and waste products, all determinations being made with a Babcock machine:

| | | | | | |
|---|---|---|---|---|---|
| Jerseys, | 109 | churnings, | average discrepancy | .1 | pound fat. |
| Guernseys, | 90 | " | " " | .17 | " " |
| Shorthorns, | 105 | " | " " | .29 | " " |

As each of these churnings represented the daily milk from twenty-five cows, can we ask for a more decisive testimony as to the accuracy of the method?

But all that has been said is either historical or more or less general. I wish now to make some specific assertions as to the places, which in my opinion, the Babcock test should occupy in the dairy work of the State.

1. Every butter factory should use one as the basis of payments to patrons. Every cheese factory should have one also as the test is equally applicable to cheese making.

2. Every large private dairyman should own one in order that he may properly study his cows and his processes.

3. In every community of small dairymen there should be found a Babcock machine to which all should have access. This may be owned by the local Grange, among whose members shall be found a bright young man, trained at the Maine State College Dairy School, who shall make the tests and keep the records.

I now come to that part of my subject, the discussion of which is the special object of this paper, viz: the adaptation of the Babcock test to the business side of the factory. When this test was first proposed to Maine dairymen there seemed to stand in the way of its successful adoption several perplexing difficulties, as follows:

1. The test only shows butter fat and not the amount of butter that can or will be made. Patrons are paid at the rate of so much per pound of butter. How can we harmonize the two facts?

2. The relation of the fat in milk or cream to the amount of butter made is not a constant one, owing to the variations in the amount of water in the butter and varying losses of fat in the process of manufacture. This makes it impossible to calculate exactly how much butter a given amount of butter fat will make.

3. The cream is measured in inches. Inches multiplied by the percentage of fat gives neither pounds of fat or pounds of butter but simply inches of fat, and this means nothing. If it did, the inches of cream which go to the factory are more than is measured in the can, owing to a certain amount of skimmed milk being drawn off, and this fact increases the apparent difficulty.

The recommendation from the Experiment Station has been and is now that the amounts of butter fat furnished to the factory by each patron be made the basis of the division of proceeds, no matter what is the method of measuring the cream. Is it in inches? Then multiply the inches of cream by the percentage of fat, and call the product inches of fat. Is it in gallons? Make the same calculation and you have a result which may be regarded

as gallons of fat. Is it in pounds? Then by multiplying the pounds of cream by the percentage of fat, the most sensible figures of all are reached, viz.: the pounds of butter fat furnished. But whether in inches, gallons or pounds, if I, as a patron, send to the factory ten inches or ten gallons or ten pounds out of the one hundred inches or gallons or pounds of butter fat that are manufactured into butter, then I am entitled to one-tenth the net proceeds, no more and no less. This is the method taught at our dairy schools, it is the method adopted in the large factories of the West, and is the most direct and simple method that can be devised. But this manner of calculation has met with scant approval in Maine, judging from what I can learn.

I have been amused at the reasons given for several roundabout schemes for calculating the division of cash. In one case, for instance, the cream was measured in inches in the cans and then in pounds after being drawn off. The pounds of cream were then multiplied by the percentage of fat, the quantity thus obtained being calculated in pounds of butter having 85 per cent of fat, after which this theoretical quantity of butter was divided by the original inches of cream in order to see how much butter was being made per inch. But after all this trouble, which nearly distracted the butter maker, they didn't find the actual butter made from an inch of cream, only a theoretical quantity. To be sure the final figures reached were correct as a basis of settlement with patrons. But why so unnecessarily increase labor and the chances for error? An inquiry of the manager as to why this was done, would have elicited the reply that the patrons want to know how much butter their cream is making and how much they are getting per inch for their cream Just as though a dollar taken for so many pounds of butter fat isn't just as big a dollar as when received for so many inches of cream. The farmer has so long taken the pound of butter or inch of cream as his unit for reckoning his dairy income that he seems unwilling to adopt any other.

It is in response to this sentiment or prejudice, that an enterprising business firm in this State has devised a measuring can to be used by cream collectors, the spaces of which multiplied by the percentage of fat in the cream, gives the number of pounds of butter that cream will make provid d it contains 85 per cent of fat, and provided no fat is left in the butter milk. The explanation of the can is this: a gallon of cream weighs on the average 8½ pounds. If the height of the can which is filled by a gallon of cream be divi-

ded into eight and one half spaces, each space would represent a one pound. The number of spaces thus obtained multiplied by the percentage of fat would show the pounds of fat in the cream. But if instead of dividing into eight and one-half spaces, the division is into ten spaces, so that one space represents eighty-five one-hundredths of a pound, then these spaces multiplied by the percentage of fat shows the pounds of butter that could be made, provided it contains 85 per cent of fat with no loss of fat in the buttermilk. The latter plan is the one adopted by the A. L. & E. F. Goss Co., of Lewiston, in the construction of a can which I find is in use by eight out of twelve creameries from which I have lately received statements. It is a simple method involving as little calculation as any, but is no simpler and no more conveninent than payments on the basis of the butter fat. This is very clearly shown by the following examples of the two methods.

DIRIGO CREAMERY—STATEMENT FOR NOVEMBER, 1893.

| | |
|---|---|
| Total number pounds of cream received | 40,000 |
| Pounds of butter made | 9,624 |
| Cash receipts 9,624 lb. at 25 cts | $2,408 00 |
| Expenses | 192 48 |
| Net Proceeds | $2,215 52 |
| Total pounds of butter fat received | 8.000 |
| Received per pound of butter fat | $0.277 |
| James Goodman—cream furnished (lbs.) | 500 |
| containing fat | 19.5 per ct. |
| pounds butter fat furnished | 97.5 |
| 97.5 lbs. x $0.277 | 27.00 |

DIRIGO CREAMERY—STATEMENT FOR NOVEMBER, 1893.

| | |
|---|---|
| Total number spaces (Goss can) cream received | 47,058.75 |
| Pounds of butter made | 9,624 |
| 9,624 lbs. butter at 25 cts | $2,408 00 |
| Expenses | $192 48 |
| | 2,215 52 |
| Value of cream in 85 per cent butter (lbs.) | 9,411.75 |
| Received per pound for 85 per cent butter | $0.2354 |
| James Goodman, cream furnished, spaces | 588 |
| containing fat | 19.5 per ct. |
| value of cream in 85 per cent butter | 114.7 |
| 114.7 lbs. x $0.2354 | 27. |

It is easy to see that the above calculations are equally simple, equally correct, and reach the same result. I prefer the one that involves no assumptions, that deals with no fictitious quantities, such as theoretical pounds of butter, which are neither the material furnished nor the product sold, unless perchance it may occasionally happen that the butter sold and the butter calculated are the same in amount. Why not deal directly with the quantities that actually exist? Why interpose a fictitious quantity when nothing is gained in simplicity, accuracy or justice? To me it seems absurd to do such an unnecessary thing. If the actual pounds of butter made from each patron's cream could be actually calculated from certain definite data as simply and directly, it would be well to do it. As it is I can not comprehend why a farmer should get any more satisfaction from being paid for a certain number of fictitious pounds of butter than he would in being paid for so many pounds of butter fat which he actually furnished, the possible pounds of butter from which he can estimate as closely as any one else.

I wish to utter a caution in regard to the use of the Babcock test as a basis of payment for cream. It is settled beyond question that when this method is properly used, the results are accurate and just to every patron. On the other hand it is true that ignorance or carelessness may cause such errors as to work great injustice. No creamery has a right to entrust an operation of this kind to an incompetent person, and while the process is a simple one, compared with chemical work in general, we have learned that it is very easy to secure inaccurate results, and that no person should be regarded as competent to apply this test to a large business, who has not been correctly and thoroughly instructed in its use. The experiment station and dairy school at the college have done what they could by correspondence and occasional personal visits by some member of the staff to insure a correct use of the Babcock process but it is difficult to accomplish much at arms length. Why do not the dairymen of Maine give to their station and dairy school the same confidence and opportunities which are enjoyed by such stations and schools in certain other states, and not only ask but require us to train their skilled workmen?

## GENERAL DAIRY PRACTICE.

By Hon. W. D. HOARD.

*Mr. Chairman, Ladies and Gentlemen:* There are three main factors in dairying, (1) The dairyman. (2) The cow. (3) The consumer. These three points involve the whole circle. Of necessity the main objective point of effort to secure a better state of things, that improvement we call progress, must be directed to the first point, the dairyman. If he can be persuaded to abandon his wrong ideas and practices, abandon error and adopt the truth, we will soon have progress. The cow will change for the better, machinery will conform closely to his views, and the consumer whose will is law everywhere, will abundantly reward him. The whole procession is waiting for the man who makes the milk. Although the cows and the consumers are a majority in this question, unfortunately they are not here. I wish they were and both could talk. They might make us

"See ourselves as others see us
From many a blunder free us
And foolish notion."

That would be progress indeed.

I wish myself to make this confession, you can do as you like about joining with me, silence will be taken as consent. Wherever in my past life I have failed to accomplish good results in dairying, in other words to make the business pay, it has invariably been because of my ignorance of the right principles and their true method of practice; a lack of training and skill, too much conceit and prejudice against learning of other's experience, or a lack of energy and industry. Sometimes one or the other of these traits, and sometimes all of them.

I see by your consenting silence that you have traveled the same road with me.

Now based on that confession I wish to assert a fact of experience. My failures have been traceable directly to my refusal to learn. My success, if I have had any, has been in direct proportion to the amount of knowledge I have absorbed and the practical use I have made of it. I have come to the conclusion that my case is in no wise different from other men.

The first factor in this whole business is the dairyman, the man himself. You readily perceive that the whole question of reform, of improvement, of progress, waits on him. Maine is in no wise different from Wisconsin in this respect. Your progress in conquering success in this business will be just like ours. The problems are just the same. Let us dismiss at once all ideas about an East or a West in this matter, for if we do not we are beating a bank of fog instead of hard facts.

What shall be done with the man who keeps the cows?

He must be better educated. There is no help for it if he expects to make profit from the cow. As a rule, farmers in Maine and Wisconsin alike, do not believe this until they have been brought down to it by sore experience. Nine out of ten farmers think they know enough to handle cows successfully, because they were born on the farm, have farmed all their days, so did their father before them. They have associated with cows from childhood up. Shall any man tell them that they need a much better dairy education than they have to make good money from cows? How preposterous! Yet my friends I dare affirm it It is everlasting truth. All that stands in the way to-day of double the profit farmers are making with cows, is the education of the farmers in this line. There is a great deal more in this business than he thinks. If he had a better education he would see it He don't see it, therefore he thinks he don't need it. Hence a slow and needless rate of progress. Don't think that the situation is a whit different in Maine than in Wisconsin. The consumer is waiting, the cow is waiting; everybody is waiting. For whom? For the farmer to come to a right comprehension of what he needs to be, of what he needs to have, what he needs to do, to fill successfully and profitably to himself this one place of a dairyman.

First, let me say, he needs to see that he needs knowledge, and be willing to put forth some effort to get it. It can't be forced into him by the State and nation. Christ said, "Except ye become as a little child ye shall in no wise enter the Kingdom of Heaven." That means that we must become teachable like a little child. It is just so with the kingdom of science, and the kingdom of agriculture; the kingdom of dairying. I have a very good chance to see this. The Hoard creameries about Fort Atkinson, Wis., number nearly six hundred farmers as patrons. My friends, there is a very great difference in the yearly profits of those men. What they are,

the men of New England, New York or Pennsylvania are. The same principle controls in every case. The patron who is ready to believe that this business requires better thinking, study and education, invariably makes the most money. There is not one exception to the rule. The man who is unwilling to invest any effort, or study, or money for his dairy education invariably shows the least profit per cow. There is something strange about this. If I should tell one of these low profit patrons that if he would go to Chicago or St. Paul and spend twenty-five dollars it would add ten dollars apiece to the profit of his cows, he would go at once. But if I tell them that if they will travel fifty miles and attend a dairy convention, where sharp practical questions relative to the management of a dairy farm or dairy cows will be discussed, not one in ten will go to that convention. It is just so in Maine. Not one farmer in ten who should be here, is here, to get stirred and educated to better ideas and practice. Not one farmer in ten, even among those who really want to make a larger profit on their cows, believe that the way to get it is through a better education on this great question. The cheapest and best way to learn anything, is by getting hold of the experience of others. That is the only way the lawyer, doctor, mechanic, banker and manufacturer, learn the lessons of wisdom in their business. You will always see them anxious to listen to questions, to read what others have found out of value in their business. They meet together, they write for their several professional journals, they strive to keep educated in their business. Those among them who do the most of this succeed best. My friends there is no exception to this rule, that I have ever met. The law is just as rigid among dairy farmers. Every dairy farmer should ask himself the following questions several times a year:

Am I making as good profit from my cows as other men are? If not, why not?

Am I putting my own conceit or prejudice, or ignorance in the way of my own progress?

Have I ever really roused myself up to an effort to understand what this business we call "dairying" means?

You and I must face these questions, whether we live in Maine or Wisconsin. If they don't reach our heads they will reach our pockets, and don't let us forget it.

In one sense I have been in the fore-front of this matter of dairy education for over a quarter of a century. I have heard men who

were failures, repeatedly charge their failure to the land, the climate, the markets or the times, and yet my friends none of these things were to blame. The difficulty was that the men themselves would not invest a cent, or an hour's time in their own dairy education. Right around them were men who did believe in the opposite, who succeeded, who made large profits. If you want to follow an unthinking business, where you will not need to read of what other men are doing in it, and keep your mind constantly on the stretch to make better progress, turn lawyer, preacher or politician but don't meddle with cows.

The successful dairyman must not indulge in this too common idea of despising so called "book farming." Dairying has come to have a special literature for itself. It has a grand army of earnest, scientific men all over the world all earnestly hunting after important facts with which to correct the judgment and improve the practice of the dairy farmer. No intelligent man in the business can afford to despise this force or keep his mind out of the current of these facts. We should remember in this business that the successful dairymen must make the finest kind of food for the most wealthy and critical people in our large cities. Fine milk, cream, or butter is a refined food. If you choose, you can make butter for the poorest and most ignorant of people, and you will make corresponding progress and get corresponding profit. Lots of farmers do this, as you can see by the enormous amount of poor grease sold in the market for low prices.

There is ever before us a twenty-five cent market and a ten cent market. All over-production of dairy goods is for the last market. There never yet has been an over-production of fine goods.

There is another peculiar feature about dairying. All of the finer goods are the product of intelligence, somehow or somewhere. It is not so with the wheat and general grain farmer. Whether his wheat be the product of intelligence or ignorance it brings about the same price. But in dairy farming there is a chance to make a material difference with your reward by the use of thought and skill. By the use of thought and skill the farmer breeds an improved cow. The modern dairy cow is no longer the creature of chance. She is evolved by scientific breeding. All over the land plain, matter of fact farmers are making a scientific study of the problem of breeding a special purpose dairy cow. We must have such a cow or fail in the merciless grind of competition. The old Maine as well as

the old South must give way to the demands of to-day. The average of the old time cows of Maine was only about 3,000 pounds of milk a year, producing only 125 pounds of butter. That was when hay was worth only eight to ten dollars per ton and grain feed in like proportion. Every item of dairy expense has increased a hundred fold, but the farm and the cow, have, in a majority of cases, remained stationary. Hard, sound thinking, better dairy intelligence, will change this if you will let them, by the use of clover, and fertilizers, and improved methods, like the silo for instance, so that the old farm will keep two cows where one grew before and the milk of each cow with its butter content will be doubled in amount and value. All this the scientific thought and purpose of the day is willing to do for the farmers of Maine or Wisconsin if they will but allow it. Put yourself in harmony with this purpose first, so that knowledge and profit will come. I am one who believes sincerely that dairy farming can be carried on just as profitably in Maine as in Wisconsin. But to do this there must be a willingness to absorb a broader education along these lines. That is all that is necessary. There are special rewards for the practical farmer who will make a study of the science of feeding the dairy cow. It is wholly a matter of study, scientific study if you please. How shall man understand the laws which govern this one question if he refuses to place his thoughts in harmony with the science of this question? All that we know of those laws, their meaning and application, has come through scientific investigation. No set of men have been more abundantly blessed in this respect than the dairy farmer. What a helpless man is that farmer who does not know or care for what science has to offer him. We often make a serious mistake in supposing that we must have a scientific education in order to appropriate this knowledge to every day, practical use. My friends there is no word worse misused among farmers than this one word "practical." Many dairymen call themselves practical because they know nothing except what they have practiced very imperfectly; know nothing of the experience or practice of other men; never read or study the literature of their business; know nothing of the investigations of science. Such men will boast of being practical. If all dairymen were like them, we would have no scientific investigations, no experiment stations, no feeding experiments, no dairy schools, no Babcock test, no breed list at the World's Fair, no

breeders of dairy cattle, no inventions of useful machinery, no dairy papers, or dairy literature of any kind, no creameries or cheese factories, no refrigerator cars for the transportation of perishable dairy products, no dairy Boards of Trade, to bring the buyer and seller more economically together, no improvements in barns and stables, no progress anywhere. For these men never believe anything "practical" except what they have practiced, and can understand. They turn their backs on all study and intelligence as an aid in dairying. Do you believe such men are practical? Such men are sadly out of place in dairying. They must quickly fall behind.

Every man who keeps cows for profit needs to post himself as quickly as possible with all that is known of breeding dairy cattle, the laws that especially govern their profitable care and the why and how of feeding them. Still more, he should be an earnest student in the science and art of producing abundant food cheaply. He cannot do this to his own best profit, without he becomes a student as well as a worker. I find in my close, sharp contact with the patrons of the Hoard creameries for instance, and there are about six hundred of them, that in every case the men who make the largest profit per cow are the men who make students of themselves, who pay the most for knowledge. They are the men we find attending the state dairy conventions, and visiting successful dairy farmers in other parts of the state. On their tables I find such book as "Stewart's Feeding Animals." They will own a Babcock test and are all the time testing their cows, and are constantly on the lookout to find a good cow to put in the place of a poor one. They build silos, send for the bulletins of the Wisconsin and Maine experiment stations, buy thoroughbred bulls, in short, take every advantage they can, of the conclusions of science to aid them in practical dairy farming.

Take this matter of feeding for milk, for instance. Milk is a highly nitrogenous compound. The caseine is almost pure albuminoid and is one of the three chief constituents of milk. It is almost amusing to note how crude are the judgments of some dairymen on this subject. Last summer a neighbor asked me for a reason why certain foods were recommended for butter cows. I commenced by trying to show him the character of milk, how it was composed of about four per cent butter fat, three and one-half per cent caseine and four and seventy one-hundredths per cent milk sugar, etc.

"Well," says he, "I don't care for these other compounds; show me how to feed for the butter alone." I replied that I would do so if he would find me a cow that gave milk composed of butter fat alone. The composition of milk should teach us, approximately at least, how to feed. We cannot get the butter fat without the caseine, sugar, etc. Hence, we feed a balanced ration, one that is sufficiently composed of albuminoids to enable the cow to produce milk which is a balanced food of itself. There is no such thing as a horse which has two trotting legs and two running legs. Whether he runs or trots he must be fed for all four legs. It is so with the idea of feeding for milk. The cow must have access to food abounding in the right elements for the production of milk. There is a great deal of significance in that word "balanced." This sort of food is known under the three names of nitrogenous, albuminoid and protein, all practically meaning the same in their effect on physical economy. Now milk was not originally designed for your consumption or mine. Its original purpose is for the offspring of the cow. If you put yourself in the calf's place it will not change the purpose of nature. Milk is, as I said before, a balanced food product and requires a balanced ration. In butter making we make direct commercial use of only one part, the fat, but we must feed for the production of all the constituents in the milk. To this end it becomes necessary to select largely of foods that most abound in albuminoids. These are cotton seed meal, oil meal, pea meal, bran, gluten meal, etc. There is another reason why the cow should have plenty of nitrogenous or muscle and nerve supporting food. Milk giving is a maternal function. This function draws very exhaustively from the nervous forces and system. The cow that produces a pound of butter a day and other accompanying solids, has drawn more on her nervous force than the ox who pulls at the plow all day. For this season she must be handled so as to prevent nerve exhaustion, and fed so as to support the nervous system. The protein foods are essentially nerve and muscle supporting, and if a good cow produces milk profitably, she must be fed an albuminoid ration.

Because a man keeps cows is no sign whatever that he is a successful dairyman. In the eight Hoard creameries about Fort Atkinson, Wis., are nearly six hundred patrons. Every man has an equal chance with his neighbor, for all are paid for their milk by the test value. The butter all sells for the same price Yet there is a

wonderful difference in the result per cow and per 100 pounds of milk, and finally per pocket. Here is one man with an average of nineteen cows, nine of them two-year-old heifers, whose average yield of milk per cow at the creamery was 4,796 pounds, producing 289 53-100 pounds of butter per cow, and for which the creamery paid him for the year an average dividend of $1 36 per hundred pounds Here is another man who is contented with less milk per cow and an average annual dividend of 97 cents; another with less milk and a dividend of 96 cents; another with less milk and a dividend of 93 cents; another with less milk and a dividend of 91 cents. The first man is a dairy student. He reads and studies the experiences of other men. He is not bound up in his own conceit. He realizes the fact that success with the cow is very largely a matter of good judgment, and that to exercise good judgment he must study and educate himself on dairy questions. You can judge for yourself whether it pays or not.

Let us take two cows each giving six thousand pounds of milk a year, one a three per cent cow and the other a five per cent cow and find the difference between the net profit of each. The three per cent cow will produce 207 pounds of butter in the year, and the five per cent cow 345 pounds. If the butter sells for an average price of twenty cents a pound, one cow earns $41.40 and the other $69. Allowing $30, or cost of keep, in each case we have a net profit of $39 for the five per cent cow, as against $11.40 for the three per cent cow or a difference of $27.60 in favor of the best cow. On this question Mr. C. H. Everett, one of the closest reasoners among Wisconsin dairy farmers, says, "There is a big field right here for the Babcock test, and a still harder task to convince our farmers of the importance of investing $10 to save hundreds." Again we can see that "knowledge is power."

Progress in dairying in any community, East or West. has been in due proportion, every time, to the way the farmers have placed themselves in harmony with the conclusions of modern dairy science. Wherever they have kept up with the movements of mind on this question there we find progress. My friends it is not a question of geography but a question of intelligence. I can find prosperous dairymen in Texas and the opposite in Wisconsin. Science is doing more for dairying than for an other branch of agriculture.

As an illustration of progress I cite you the town of Bovina, N. Y., one of the most prosperous townships in the United States.

Thirty years ago there was scarcely a herd in that town that averaged over 150 pounds of butter per cow. To-day the average is about 225 pounds and there are a number of herds that produce over 300 pounds. The farms have come up in fertility so that they will average to sustain double the number of cows they did thirty years ago. What has done this? The increase of dairy thought and intelligence. Those farmers have been liberal with themselves in this particular. I doubt if there is a township in the United States where there are as many farmers who read as much on this subject as in Bovina. That led them to the first work of improving their cows, and to-day it is a great park of high grade and registered Jersey cattle. To secure progress, we must imbibe progressive ideas.

Breeding simply means the continuation and increase of special talents or functions for special purposes to meet the special neces i-ties of men who are trying to produce a special product and who need all the ability they can get to overcome the special expense of producing that product. You see this idea of specialty dogs the footsteps of the dairy farmer at every turn, whether he realizes it or not. To me it appears as clear as noonday that the law and logic of *profitable* success in dairy farming is built solidly on this idea of the farmer educating himself better in the principles of dairy breeding. It is not enough that here and there, fifty miles apart, there are men who know how to breed cows. Every dairy farmer must study the problem. It is *his* judgment and effort that must tell the story for himself finally. A farmer who will not post himself right here, is not apt to make even the faintest step towards progress.

The Bovina farmers next took up the study of improved housing of cows and feeding of cows, but to make these last provisions successful, we must have a good cow.

### THE ECONOMY OF BETTER BREEDING.

I meet with some of the strangest objections from farmers to these ideas. Many of them say; "If everybody improves the quality of their cows as you recommend it will over-load the butter market and carry the price below profit" My answer to that is in a nut-shell. Breed, handle, and feed better cows, and so produce the same amount of product you now do, with half the number of

animals. Don't put out your own eyes with the idea that it will save sunlight for general consumption. Don't sacrifice yourselves with a lot of poor cows, to keep up the butter market. Remember that there has never been an over production in anything connected with dairy husbandry except poor dairymen, poor cows and poor butter. Shall we have the poor with us always?

Another objection urged is that they cannot afford to purchase good registered stock to improve the herd. The value of the money is its interest value. One hundred dollars can be hired for six dollars a year. It will buy a good registered bull and start the herd on the road to ten times that interest value a year, for the same cost of labor and feed. Verily there are men who are afraid to pay fifty cents for a dollar bill. And they call that economy. Going without a necessity is not economy. That is privation. Economy consists in a wise spending of money, time or labor. That man will never be a truly successful dairy farmer who does not study how to spend money wisely. Getting rich at the little end of the horn is a hard job.

### THE LAW OF SELECTION.

Mistaken notions of economy are again seen in the refusal of dairy farmers to follow out the principle of selection. A man must look upon his cows as so many forces on his farm. He has no business to maintain idle force whether cows, men or acres and what is more, he has no business to nurse and maintain ignorance of those forces rather than knowledge. I am annoyed at the number of men in the dairy business who are contented to remain ignorant of what sort of cows they are keeping, and that year after year. It requires but a small sum to purchase a Babcock tester. It requires but a little study and practice for an ordinary intelligent man to learn to manipulate the test. It will prevent him from being constantly cheated by the cows he owns and by those he wishes to buy. It is a simple thing to do. Yet not one dairy farmer in a thousand is doing it. And these men call this economy.

The facts as fast as they come to light are all with the test. I have seen many dairy farmers change their ideas and practice almost to a "right about face" in a year under the teaching of the test. Here is a rule from which I know of no variation of shadow of turning:

Dairying for profit must be measured by net income. Poor cows never return a net income. Such is the strangeness of human nature, however, that thousands of farmers will admit the truth of that rule and yet never do anything to make it true in their own case.

### BETTER METHODS OF STABLING.

Cows are kept in stables six months in the year. But little progress has been made by the average cow keeper toward improvement. This question of stabling is one of the most important with which we have to deal, for three great reasons.

First. It affects the economy and results of the feed we give the cow.

Second. It affects the health and vigor of the animal and that affects the amount of her product.

Third. It affects the quality of the milk and butter, and that affects the price we are to get per cow.

## REMARKS OF EX-PRESIDENT MERRITT C. FERNALD, DOVER, ME.

*Mr. President, Ladies and Gentlemen:* I can assure you this is an unexpected call upon me at this time. Your chairman has given me no warning that he was to call upon me for remarks, and I do not know what can be added to the important lessons to which we have listened this afternoon. I only hope that they may be well taken to heart, and that the dairymen of Piscataquis county and the dairymen of the State may heed the lessons and profit by them and give their cows the benefit of the wise suggestions which Governor Hoard has made. With reference to this subject of general dairy practice I am not prepared to speak: but I can say that within my remembrance and in fact I may say within the last fifteen years, indeed within the last ten years, if I have observed correctly, there has been a large improvement along these lines. I do not say there has been the improvement made that ought to be made, but I do say that the farmers of Maine, to-day, have better stock, they take better care of that stock, and they produce better articles of cheese and butter by fifty per cent than they did ten years ago. I think these facts may have resulted

largely from the agitation of the subject, from these dairy conventions and from the general wakening that has taken place along all lines of agricultural effort. You will pardon me, my friends, if I take pride in saying I believe also that this improvement is in a measure due to the good work that has been done at the Maine State College. Look at your programme to-day. I know it has been fashionable at times to complain because the men at the college were not doing for the State, and the college was not doing for the State all that some people conceived it ought to do. Look at your programme for this convention. You will find one-half of the speakers, in fact, all that are not imported from without the State, come from the Maine State College. The work these men are doing here, we know will help along the dairy interests in this locality. The same which they are doing here they are doing in other parts of the State, yet with these men this is a secondary matter. You will understand that their chief work is at the college and their main duties are for farmers' boys or the boys sent there for them to instruct. The work therefore which they are doing before such conventions as these is extra, gratuitous work. I shall take your time but for a moment As I said I had no expectation of being called upon but I assure you it affords me very great pleasure to meet here so many of the citizens of this county, so many of the citizens of this State and to bear my testimony to the quality of the work that is accomplished by the college men, to bear my testimony, and I am in a better position to do so now than ever before, to the efficient work that is being done by this institution which you are all called upon, in a measure, to support. There is one point in relation to the college to which I wish to refer for a moment, now that I am upon my feet. In the Maine State College there is a special provision made for instruction in dairying. It seems to me that it is a shame to the people of this State, to the farmers of this State, that they do not send more of their sons to profit by the instruction which is given. There is present in this hall a young man from the western part of the State who has taken the course in dairying at the college and he has informed me since he came here, he has placed on these tables butter of his own production, he has informed me that he profited very much by the course of instruction he there received. The advantage is well expressed in his own words: "It has saved me in the year

since I was there, in my own business, more than all the expense to which I was subjected in taking the course of study." It seems to me that here is a point from which young men from Piscataquis county can and ought to profit. It is a point which young men over the State ought to know and from which they ought to profit. There is the institution, there are the appliances, there are the instructors. Now what are you going to do about it? Are you going to avail yourselves of these facilities and tax these men to the utmost to give the instruction which they are paid to give, or are you going to allow them to remain there, accomplishing only in part what they are desirious and capable of accomplishing? They want these boys, they want these young men, and if you desire to advance the dairy interest in this State, it seems to me that in no better way can you do it than by sending some bright young men from Piscataquis county, some bright young men from all sections of the State to the dairy school and let them prepare themselves to diffuse their knowledge, thus acquired, among the general farmers. You will find dairying throughtout the State will be toned up, and better work will be done than ever before, and instead of a progress in this line, of fifty per cent, any one of you would say in the next five years if you follow out this suggestion, the progress has been more than one hundred or two hundred per cent, as you will be in the way of profiting fully by the possibilities which are before you.

Thanking you for the attention you have given me, I will leave you with my best wishes.

## TALK BY PRESIDENT HARRIS, OF MAINE STATE COLLEGE.

*Ladies and Gentlemen*: It was intended that this address should be delivered by one of the professors of the college and illustrated with magic lantern views. It became impossible to carry out this programme, but the electric light company seems to have known of the plan and made preparations accordingly. [The electric lights went out before President Harris began to speak.] I regret the professor is not here with his lantern.

If one were to go back a few years,—not very many,—he would be surprised to see how much ideas in regard to higher education have changed. The catalogue of any well regulated college contains a long list of professors teaching science.

So rapidly have new sciences and new branches of old sciences multiplied in recent times that their number is almost endless. Twenty-five years ago the faculty of a college was largely made up of professors of Greek, Philosophy and Mathematics.

At that time agriculture was by all means the most important industry of the country and occupied a position even more prominent than it does now. But there was no place at which a young man might study technical agriculture. There was at the same time a demand for education in engineering. There has been founded a large number of colleges by the churches, but these gave no instruction in engineering. To supply the need in these lines the U. S. Government gave a grant of land to each state to found a college which might teach anything or everything, but must teach the sciences relating to agriculture, engineering and military science.

The State college for Maine was erected at Orono. It has buildings and equipment worth a quarter of a million dollars, an income for instruction and investigation of forty-six thousand dollars, and two hundred and thirty one thousand dollars in endowments. From tuition the college has nothing, for the State makes tuition free. From the room rent it has nothing, as rooms are free also. The State college is free to every boy and every girl who seeks it for an education. Our students live comfortably on $175 per year.

Our work is arrayed in several courses. We have no classical course as work of other kinds is more needed. The scientific course is the usual college course, with the substitution of modern

languages, mathematics, natural science for the ancient language. There was a time when people were ready to say that such an education was not a real collegiate education. But at present such a course is to be found in every progessive college.

Civil Engineering and Mechanical Engineering courses may be called the school of technology, corresponding to the famous school in Boston.

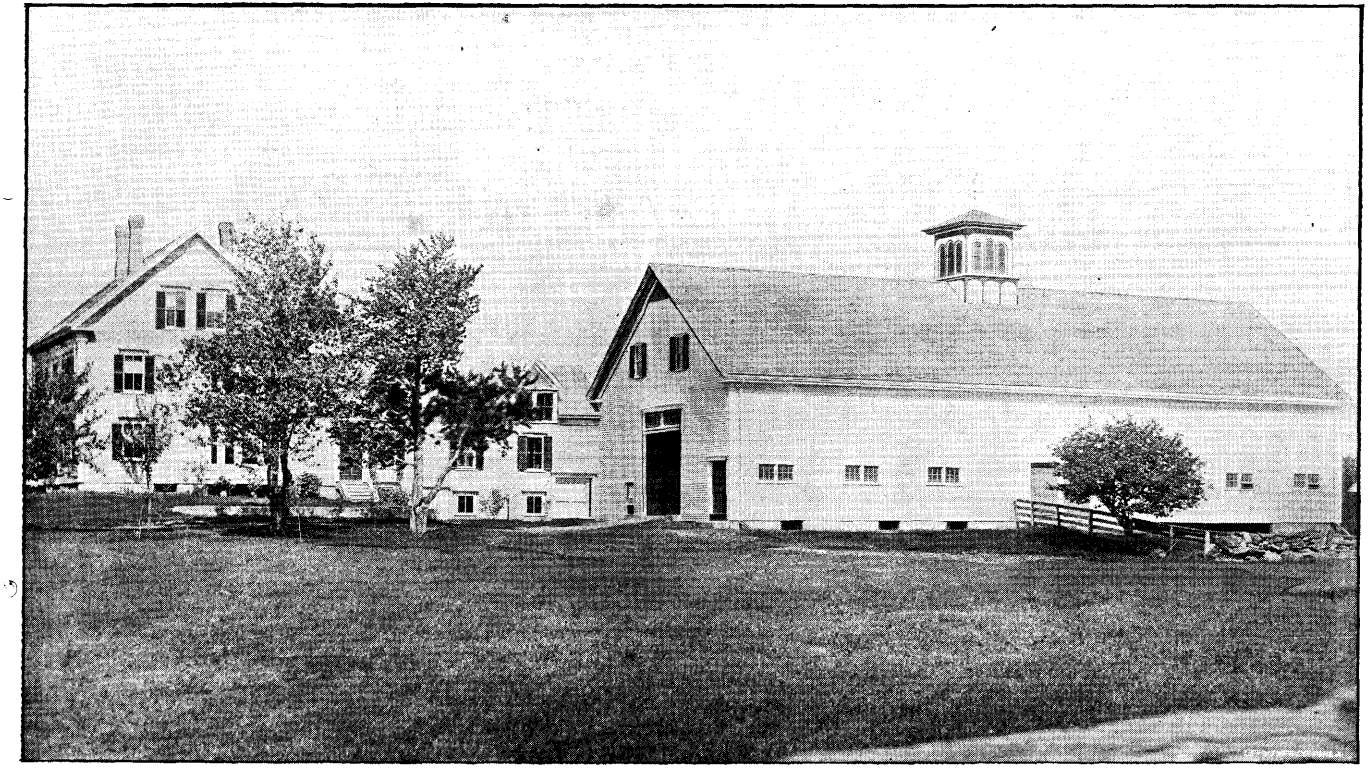
The third branch of our work and one you are most interested in is the school of agriculture. To no line of our work have we given more careful attention than to agriculture but the number of students is not great.

Fifteen thousand dollars of our annual income is expended every year in agricultural investigation. Some are most interesting.

The students in the college courses in agriculture have devoted themselves largely to investigation. We have established short courses in agriculture.

The college established, two years ago, the short course of sixteen weeks in agriculture absolutely free of charge. This course is intended to be thorougoly practical and is offered to the student at the cost of board and lodging. In addition to this we propose to offer courses of systematic home readings in agriculture and courses of lectures in various localities throughout the State whereever a class can be organized under an agreement to attend regularly and pay the expenses.

In the various lines of technology, science, literature and language, with the exception of Latin and Greek, the work of the State College is unexcelled and by the bounty of the State it is done at a cost not to be equalled in any other institution of the first grade in the State.



FARM BUILDINGS OF HON. RUTILLUS ALDEN, WINTHROP.

# PAPERS PRESENTED AT INSTITUTES.

## THE DAIRY AT THE WORLD'S FAIR.

By JOHN GOULD, Dairy Editor of Practical Farmer, Philadelphia, Pa.

Those who had high expectations that the great Fair would be the scene of the greatest dairy exhibt the world at large ever saw, went away from the Fair with much disappointment in regard to the magnitude of the display; but if they study what was done, the painstaking manner and exactness that characterized every detail, it will soon be discovered that the lessons which may be derived from the dairy department, will not only be of signal value to the dairy world at large, but at the same time will overthrow some of the long-accepted traditions of the dairymen of this country, and come in many respects very near putting dairying into the lists as a demonstrated science. That the exhibit was not larger was no fault of the dairymen of this country. That there was no dairy school, daily lectures, a grouping of the best dairy mechanism, and daily exhibits of it, and everything in place to make a fitting display of the largest industry of the country, cannot be charged to the apathy of the men who own the dairies, but to the powers in authority, who failed to recognize the fact that it needed time, money and preparation to produce a great dairy exhibt, and so the "Columbian Dairy Association" after being fully organized, and work laid out, was led to a slow, but sure death while awaiting official (?) recognition, and after delays that made a great show impossible the dairy was recognized, but so tied with red tape and hedged about with "boards" and "orders," that the original idea was hard to recognize Yet far was it from a failure. Now and then a man, or a reporter was denied admission to this or that part, and quick the word went out that there was "trickery" going on, and the show was a b-a-d failure, so as to get even with the management; but at last when the final summing up was made, it was found out that so far as three of the great breeds of cows were concerned, the accuracy of every detail in connection with their feeding, the skill of chemist, and those who worked at churn and vat, some very important things were settled, and in the future we shall have a much more definite

basis from which to make our calculations. To visit the Fair, to simply see, and taking only superficial observations of things, and they to be used as marks of criticism, was one thing, and to get accurate data for instruction, was quite another. And, in the latter, though we might wish that the tests covered more breeds, and that there could have been a greater display; and more, a dairy school taught by such men as Henry, Roberts, Babcock, Cook, Cadwell, and a dozen others, with the aid of the best object lessons that the world has ever seen on one exhibition ground, the outlay has already paid for itself over and over; and so far as conclusions are concerned, it is not too much to say that the dairy part of the Fair will take rank as the most complete feature of the great enterprise, which is proper.

THE EXHIBIT.

There was no end of the dairy exhibit, for it was scattered here and there all through a half dozen buildings, and no official catalogue to aid one in the search, so one came upon the mechanism of the dairy here and there, and the effect was lost that would follow, *i. e.*, if the dairy exhibit had been all under one roof, as it should have been. As it was, one found the American machinery here, and the foreign, as a rule, in their separate national exhibits, so that comparisons were difficult. As, for instance, the Danes are, as well as the Swedes, greatly interested in dairy invention, and in some respects in advance of the Americans in invention, and to see each, it was necessary to find their separate exhibits, so it was up stairs and down stairs, and away yonder, to get a comprehensive view of the machinery, and when found it was still and motionless, because the authorities made no provision for its operation, and so far as seeing a thing and judging of its merits by actual operation, one can quite as accurately pronounce on the flavor of imported wine by reading the gaudily printed label that wraps the bottle. Down stairs in one of the fourteen-acre buildings, was the Canadian cheese, one of which weighed nearly nine tons, and was kept in an iron jacket with one little glass peep hole in it, and about it were six more, that weighed 900 pounds each. Seemingly a half mile away, up stairs, where only a dozen visitors out of a thousand found the corner, was the finely finished separators and mechanism of the United States, but again it was talk and not actual operation that must satisfy the visitor. To be sure, there were extractors and all kinds of separators, butter workers, cream tanks, churns

and testers, etc., but if the sight-seer would know of their operation, he was referred to the dairy house, where the tests were going on, and arriving there he found that all that were visible were two separators, a churn and a butter worker, and that the work was done early in the morning while it was cool, and so more still machinery was met with, though the look was more dairyfied. Where was the milk being tested? Why, over in the laboratory, but that was such delicate work that no one was admitted but the experts, and so we did not see the working of the Babcock milk tests, and the other scientific demonstrations; and another great feature of instruction was lost, because of the failure of the Fair managers to build, as they should, and made somewhere a working dairy school, where the whole process could have been witnessed from closely approaching galleries. Up stairs one might see the new methods of sterilizing milk—the freeing it from germs, so that one shall not run the risks from drinking milk that has from all time endangered the human race, though if one would walk a mile to the government building, Prof. Conn would there show him the bottles in which the bacteria, destructive and beneficial to milk and its products, were frisking about in gelatine, and if the time of day was in conjunction with your visit, you might catch a glimpse of these tiny enemies and friends of the dairyman through a powerful glass, or be regaled with the flavors they produce, good and bad.

### THE BUTTER EXHIBIT.

In the dairy houses were long ranges of glass-fronted refrigerators, and spaced off so that any state that applied for space for exhibition purposes could, as they elected, make exhibits of butter from their respective states, and all each month, or period agreed upon, enter the lists for marking and rating by the judges. Only a few of the states were represented, and those not all of the time. As the exhibits were in cold storage in these cases, it was not possible for the visitor to gain any great knowledge, beyond a glass view of the merits of the samples shown, and as each and all of them were the work of trained makers, and all colored a June tint, the descriptive text by the State superintendent was little more than praise for their respective states, though Nebraska did give a cracker and a crumb of butter on it, to give a taste of what a full meal would be, spread with their butter. The skill of the finishers was carried to a fancy degree in some of the cases, for one might

see butter fashioned into all fancy forms—scrolls, flowers, leaves, fruits, and even the human form itself, for in the Florida building, a native artist had with tiny trowel and a sliver made a life-size bust of Isabella of Spain, and a Mrs. Wadsworth of Illinois, won great honors for her skill of making fanciful forms and fashionings of butter, her tools being only two little butter paddles.

### AT THE DAIRY HOUSE.

It would be difficult to imagine a building constructed on a plan more foreign to the successful working dairy room, than the one on the Fair ground for the use of the dairy experts and chemists, in which to conduct the dairy tests; and then to it, add a full glass roof, between which and the floor there is no protection from the sun, save a lately-hung horizontal curtain of cheese cloth. But on this floor were some of the greatest demonstrators of dairy science going through the daily details of the great test of dairy cows. Think of meeting in ten minutes such an array of talent as Roberts, of Cornell, Henry and Babcock, of Wisconsin, Armsby and Cadwell, of Pennsylvania, Alvord, of Virginia, Robertson, of Canada, Scoville, of Kentucky, Farrington, of Illinois, and even others, not to forget W. H. Gilbert, of New York, the superintendent, who is hardly less noted in the dairy world than those mentioned. The work in this department was the most responsible of all, for with the accuracy of their figures, went the final decision of the awards in the battle of breeds. Everything here was done with the double accuracy of seal and key, and fortified with duplicate analyses of each step in the work. Into this room came the milk from the stables under seal, where it was again weighed, then the seal broken and duplicate samples taken from each can. The milk of a herd went into a herd vat, tempered, and again a sample taken. Then it was run through a separator and the cream weighed, samples taken, and also that of the skim milk, to find the waste of the separators. The cream was ripened for twenty-four hours, when it was agan weighed to account for evaporization, the cream can washed, and a sample taken to find the loss from sticking to the tin. Then when the cream was churned, the buttermilk and washings were sampled for loss of fat, and when the butter was worked down to the point thought right, six samples were taken from the worker, to determine the water and the solid content of the butter; then the whole was again weighed, the com-

mercial butter credited. The tests for loss of the fats at each stage was brought in from the chemists' computations, and credited to the herd's total butter fat production, to see what the loss had been in manufacture. The butter of the three herds was worked up separately, each with the same painstaking care. Then this butter was put in cold storage for so long, when it was scored by three judges, who marked it as if on a critical butter market, and fixed its price for the final figures, because this test in the battle of the three breeds, is to take into account the cost of the butter in food at market rates, flavor, texture, color, etc., the idea being to find what butter costs, the losses of manufacture, and market judgment.

While we watch the different processes of butter-making, some new things meet our eye; the great idea was exhaustive churning, and here, where the cows were kept in one condition, and practically fed on similar foods, it was noticed that the expert who managed the churns started the churn of the Shorthorn herd at 41°, and the Jersey cream at 54°, and the Guernsey at 48°, and the chemists' report the next day showed that the churning was about as perfect as can be looked for with a churn. In churning, about forty-five minutes were consumed, and the granulation was simply perfect. It was washed three times in the churn, the salt worked in, one ounce to the pound, of which nearly one half went out in the remaining water, when it was put upon the worker, worked down dry, and packed into both crocks and ash tubs. In the making, only about two ounces of fat was lost in 100 pounds of milk, between the stables and the final butter package, and shows that skill, and cold churning in the summer, bring the butter, and all of it, practically speaking.

### NEW INVENTIONS.

As to new inventions, there were few, if any, of great note, the main thing being improvements on the not long ago invented th ngs, and what is more, none of these very last things were in use at the dairy house, where the breed tests were going on. In gravity setting there was no new device, and in separators there was nothing later than the "U. S." Of new churns, there were some, but at the tests, a box churn was used, as up to date nothing exceeds its close working, and for aerating milk where one has time, the long-handled dipper is not excelled.

### ABOUT THE CHEESES.

In the cheese tests the best American maker demonstrated that the finest cheese in the world—of the kind—could be made in Chicago; and more, that milk with five pounds of fat in it to the 100 pounds of milk, made the most and best cheese; and that rich milk was what was wanted and that the old tradition that only three and a half per cent of fat could be kept in a cheese curd, was all moonshine, and the fellow who said that it could not be, had skim milk cows for sale. Nearly all of the foreign nations in their exhibits had their noted brands and kinds of cheese. Italy had the most distinctive varieties, some ten, from Parmesian to Cassio Cavallo, and other governments had nearly as large exhibits; some, though small, made up for the latter in smell, though our Anglomaniacs tell us that the latter are of a quality that will make the mouth of a gourmand water, however exacting it may be. As has been said, Canada had the largest exhibit of cheese and carried off the first honors in the general display, and is proof that her policy of governmental inspection of cheese factories, and a live, working dairy commissioner, who himself is an expert, has paid that county fifty times over for the outlay, if only in reputation. Again it is a matter of regret that these cheeses, scattered here and there, were not all together in a well constructed exhibition room, and where at 2 P. M., a descriptive lecture could have been given for the benefit of those who would have been highly delighted and instructed as well.

### AT THE DAIRY BARNS.

It was the original design to have at least six of the leading breeds, of what may be called the dairy breeds, represented in the six-months' dairy test, but on one plea or another, the Red Polls, Ayrshires and Holsteins were withdrawn, leaving only three in the test, Jerseys, Guernseys and Shorthorns, competing. The selection of twenty five cows from each breed was left to their friends, and seventy-five finer dairy cows, from a dairy stand point, would be hard to find on the face of the earth. That the barns should have been built on the sand, at the hot end of the fair ground, was a mistake, and so the test was one of endurance, as well as performance. No dairyman could have designed such stalls and mangers for cows, but notwitstanding, the cows did well, milking up in the

thirty-pound notches, giving milk July 28th, that tested, Guernseys, 4.6; Jerseys, 4 8; Shorthorns, 3.8 per cent of fat respectively. In the barns, the general feeding was under the charge of Prof. Armsby, of Pennsylvania, and was done in the same general painstaking way that characterized the work of Dr. Babcock, in the dairy house. Each breed had a barn of its own, and was in charge of a Fair official, who saw that everything was square, the milking done with dry pails to start with. Each breed had a member of their herd club in attendance to feed and care for the cows from their ideal standpoint. All food was furnished by the Fair, and put into a separate barn, and under Prof. Armsby's charge; and while the food and kinds that a cow might have was left with her feeder, that food must come from the barn, be weighed out as well as the grain, and charged to each individual cow. There was no getting food in bulk, and then feeding as one chose. A requisition was made for each individual cow, daily by the feeder, and it was filled by the Professor. The clover and other hay was weighed out and put in a sack, and the different kinds of meal in little sacks, feed bills tagged to them, and a duplicate kept by the Professor, and all these foods were charged to the herd, upon agreed market rates, and credit given to the cow for all that she delivers in milk, to the superintendent in the dairy building. That these cows had good care is putting it mild; that they were fed all they would stand is evident. That they were fed what they would eat and no more, is also evident, as unconsumed food was a loss that was not credited back, so getting more than a cow would eat up clean, was to lower her net profit that day, by so much. The Jerseys were milked three times a day, the other breeds twice. To prevent any chance for criticism, an official handed the pail to the milker, takes the milk when the cow is finished, weighed the milk and repeated, until all the cows in the barn were milked. Two ounces of milk was taken from each cow's milk for analysis, at each milking, then when the cows of a barn were milked, the can of milk was weighed to check any errors of the single weights, the can was locked and sealed, and the milk taken to the dairy house.

THE LABORATORY.

This accuracy was duplicated in each of the three barns, and the samples of the milk of the individual cows and the collected milk in the cans went to the laboratory of Prof. Farrington, where it was all analyzed for fats, and other solids, each cow getting full credit for all fats here, and at the dairy house for finished butter, and cheese, if cheese was made. All this was tabulated and later on all that the cow had eaten, and of what it consisted was charged down in parallel columns, and at the end of the month the credits were entered in yet a third column and a balance struck, and the net profit put in the right hand pocket, as a permanent fund for her owner. The cheese test was a signal victory for the cow that put the most fat into her milk, and demonstrated besides, that no cow puts more caseine into her milk than fats, and that the man with his special purpose cheese cow that gives three times as much "other solids" as fat, is telling the truth, but suppressing the important fact, that two-thirds of the other solids go out in the whey as sugar and the like, and if the truth is told, solid fat is the test of what the cow will do in cheese, as well as fat, or rather butter. To give you a comprehensive insight without confusion incident to long lines of figures we append the official summary of the fifteen-day cheese test, preceding the butter contest.

SUMMARY.

| | Jersey. | Guernsey. | Shorthorn. |
|---|---|---|---|
| Pounds milk given | 13,296.4 | 10,938.6 | 12,186.7 |
| cheese made | 1,451.76 | 1,130 62 | 1,077.60 |
| whey credited | 11,578.7 | 9,666.7 | 10,838 9 |
| live weight | 327 | 480 | 709 |
| Value cheese | $193.98 | 135.22 | 140.14 |
| whey | 9 26 | 7.73 | 8.67 |
| live weight | 14.72 | 21.60 | 31 91 |
| Total credit | 217.96 | 164.55 | 180.72 |
| Cost of food | 98.14 | 76.25 | 99.36 |
| Net profit | 119.82 | 88.30 | 81.36 |

The Jerseys exceed the Guernseys by $31.52, and the Shorthorns by $38.46. The Guernseys exceed the Shorthorns by $6.94.

The Guernseys did not eat as much as the others, as will be seen by the low cost of food. From the above figures the following has been calculated:

| | Jerseys. | Guernseys. | Shorthorns. |
|---|---|---|---|
| Lbs. of milk to produce 1 lb. of cheese, | 9.16 | 9.67 | 11.31 |
| Cost of food to produce 1 lb. of cheese, | 6.76 | 6 74 | 9.22 cts. |
| Net profit per lb. of cheese produced, | 8.25 | 7.81 | 7.55 cts. |

The Jerseys lead in profit per pound of cheese produced, while the Guernseys produced a pound for less cost. The Jerseys produced a pound of cheese from .51 of one pound of milk less than the Guernseys, and 2.15 pounds less than the Shorthorns.

### SCORING OF THE CHEESE.

As will be seen in the following score, the Jersey cheese ranked highest on texture and keeping quality and the Shorthorns on flavor and color. The cheese was credited to each breed at the following price:

That scoring 95 to 100 points, 16 cts.
90 to 95 " 14 cts.
85 to 90 " 12 cts.
80 to 85 " 10 cts.

The standard used by the judges was as follows: Flavor, 55; texture, 25; keeping qualities, 15; and color, 5 counts.

No story of the great 90 days' butter test can be made complete, without a summary of the test, and so presented, that the reader can—at a glance—see, and can only comprehend by seeing, the final footings, and of this nothing is so complete as that prepared for that admirable journal, *Hoard's Dairyman*, also best append it, with full credit to it.

## THE NINETY DAYS' TEST IN A NUTSHELL.

*Tabular Statement.*

| | JERSEYS. | | GUERNSEYS. | | SHORTHORNS. | |
|---|---|---|---|---|---|---|
| | Total for herd. | Daily average per cow. | Total for herd. | Daily average per cow. | Total for herd. | Daily average per cow. |
| FOOD—Lbs. | | | | | | |
| Hay, old.. ..... | 7,940.3 | 3.53 | 14,343. | 6.37 | 13,545.5 | 6.3 |
| Hay, new..... | 13,270. | 5.9 | 11,775. | 5.23 | 9,565.4 | 4.38 |
| Clover, green ..... | 27,788.3 | 12.6 | 16,110. | 7.16 | 726. | .33 |
| Grass, swale ..... | 240. | .11 | | | | |
| Silage .. ... ..... | 4,617. | 2.05 | 582. | .26 | 51,707.4 | 23.64 |
| Bran..... | 11,992.5 | 5.33 | 13,040.5 | 5 8 | 10,853.5 | 4.96 |
| Middlings..... | 9,452.5 | 4.2 | 4,018.5 | 1. 8 | 5,773.5 | 2.64 |
| Corn hearts ..... | 12,748.5 | 5.60 | 7,430. | 3.3 | 9,864.5 | 4.51 |
| Corn meal ..... | – | – | 1,100.75 | .49 | 705. | .32 |
| Oats..... | 2,561. | 1.1 | 168.35 | .074 | 2,078. | .95 |
| Oil meat ..... | 4,667. | 2.07 | 2,465.5 | 1.09 | 2,180. | 1.00 |
| Cotton seed meal ... | 2,962.25 | 1.32 | 2,063. | .91 | 3,277. | 1.5 |
| Grano gluten ..... | 867. | .38 | 3,304.5 | 1.47 | 1,662. | .76 |
| Cream gluten ..... | – | – | 1,894. | .84 | 2,973.6 | 1.36 |
| Cost*..... ..... | $587 50 | $0 261 | $484 14 | $0 215 | $505 48 | $0 231 |
| PRODUCTS. | | | | | | |
| Milk, lbs..... | 73,478.8 | 32.65 | 61,781.7 | 27.46 | 66,263.2 | 30.63 |
| Test, per cent. ..... | 4,784. | – | 4,507. | – | 3,727. | |
| Fat, lbs. ..... | 3,515.47 | 1.562 | 2,784.56 | 1.238 | 2,109.97 | 1.111 |
| Butter, lbs†..... .... | 4,273.95 | 1.904 | 3,360.43 | 1.494 | 2,890.87 | 1.338 |
| Loss of fat, lbs..... . | 96.31 | – | 96.22 | – | 97.27 | |
| Other solids, lbs..... | 6,465.05 | 2.873 | 5,501.44 | 2.445 | 5,750.83 | 2.662 |
| Live weight, lbs..... | 776. | .345 | 466. | .207 | 2,826. | 1.354 |
| RESULTS. | | | | | | |
| Value of dairy products‡ ..... | $1,272 79 | $0 565 | $950 14 | $0 422 | $837 73 | $0 387 |
| Profit.... ..... | 685 29 | 304 | 466 00 | 207 | 332 25 | 156 |
| Food cost of butter, per lb. ..... | – | 1284 | – | 144 | – | 1735 |

* The different feed stuffs were charged at the following prices per ton: old hay, $11.50; new hay, $10.00; green clover, $8.00; swale grass, $1.00; silage, $2.65 (?); bran, $12.50; middlings, $13.00; corn hearts, $13.50; corn meal, $22.00; oats, $23; oil meal, $22.00; cotton seed meal, $26.00; grano gluten, $14.00; cream gluten, $17.50.

† Eighty per cent fat.

‡ Butter at 25 cents and other solids at 2 cents per pound.

This of course puts the Jerseys at the top of the list, and—if these twenty-five cows are a fair sample of the average Jersey—to the front as the great producing dairy cow of the day. True it is, if the produce, butter and cheese, had been figured at market rates—as they should have been—there might have been some minor changes, but this remains,—that the best milk is none too good for butter, and cheese as well, and in the contest to obtain it, the Jerseys won, with the Guernseys a very close second, and the Shorthorns no mean competitors. If market rates had been the final umpire as between cost of food and production, it will be

seen that two Guernseys were in the very front rank as cheese producers, and also this, that if any of the dairy breeds have cows enough to select from, so that the individual merit of the cows' performing, is of high order, great things can be attained, and what is more, the final heifer test showed conclusively that this individual temperament is born with cows, and not created afterwards, for the heifers gave milk as rich in fats, as did the old cows, and that all future feeding and care can do, is to bring them up to the normal limit of milk flow.

The Fair has brought out this matter of individuality as never before, and showed beyond doubt, that whatever the circumstance, a cow as a dairy animal, is not the product of any out-breed, but great producers of butter fat "crop" out here and there in point of superiority far above the average of their relatives of breed akin, and no feeding or cost will bring the rank and file of the balance any where near them, and the blanks that so frequently appear—that ever remain blanks—only go to show and prove that the great cow is an individual, and that while close breeding, the mating of excellencies, raise the average performance of a breed when a special object is in view, there is ever cows with noted performance appearing that no raising of averages can approach, and more, their offspring not once in ten times equal.

One can see lessons by the score in the reports of these tests, and what are the lessons? Oh, many, but the greatest one of all is that breeding and influence of family heredity is what makes good cows, those that can be depended upon (though good breeding results in a great many blanks and good-for-nothing cows), and that cows born without possibilities, can never be fed into profitable ones, and that while sinful man can be born again, a cow, with now and then an individual exception, is practically unchangeable in her qualities, and while foods may influence the amount of milk she gives, to a greater or less extent, the quality remains fairly constant through life; that talk has been more abundant in the past than the butter product of some great cows, judged by the Chicago test. That there are good cows in all breeds, and in the future, pedigree will need to be not only backed up by performance of the cow herself, but what has been the records of her family; that if fed well and properly, and the butter made as it may be, breed distinction has lost its hold in good butter production, that the good butter cow is the best cheese cow, and in the future butter and cheese will be

made from fat and caseine, and not the "total solids;" and while many other things could be pointed out, one other thing is going to be made more prominent than ever, that fat fed in the food does not reappear correspondingly in the butter fats, and we are not certain, but incline to the belief, that the unofficial tests of the past, will form little part of the dairy literature of the future, and the butter tests of Chicago will be the standard judgment of about what a cow can do in "total solids." The men who worked in stable and feed bin, by the milk can, and in the laboratory, by the creamer, vat, and churn, and added up and "struck balances" and made up the final footings, have the thanks of the dairymen the world over and from Dr. Babcock and the general superintendent, down to the humblest stable boy, each and all contributed to the greatest dairy test the world has ever seen, and set the part for those that shall come after it, for decades.

## ADDRESS ON "FARM LAW."

Delivered at the meeting of the Board of Agriculture, at State Fair Grounds, Lewiston, on Wednesday evening, September 6, 1893, by Hon. A. M. SPEAR of Gardiner.

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### THE PURCHASE OF A FARM—THE LEGAL RIGHTS AND DUTIES OF FARMERS.

To the would-be farmer the first essential is his farm.

This may come to him under the terms of some will, or may fall to him by inheritance from some relative; both these methods are very fully treated of in the Revised Statutes of our State and it will be unnecessary to speak of them particularly here.

Another, and perhaps the commonest method of acquiring a farm is by purchase.

Before the deed, or paper of transfer, of a farm can be made, there must of course be a bargain or contract between the parties. This may be either oral or written. In neither case would such a bargain alone pass the title to the land; but while a written contract would render either party to it liable for breach of performance, a mere oral contract or bargain for the farm, is not binding in law on either party.

It may, also, not be fully understood that an offer to purchase, or to sell, a farm for a given price, even though it may be in writing, is not binding on the proposer until actually accepted by the other party; therefore the proposer may retract his offer at any time before it is accepted. This is so, even though he should give a certain number of days in which the other party might decide whether to accept the offer or not.

What is ordinarily termed the "refusal" of property, is therefore a dangerous thing to rely upon unless you are dealing with a man whose "word is as good as his bond." This is so, although you may have fully made up your mind to take the farm but have not notified the owner of the fact, and should go to great trouble and expense in buying stock, agricultural implements, etc., or even had moved your family to take possession. Should the owner then refuse to sell, while you have nothing but his oral agreement, you would have no legal remedy, either to compel him to convey, or for expenses you may have incurred

Should you desire to accept an offer to sell, you must do so in the exact terms offered without conditions or qualifications, if you wish to hold the seller.

In a well known case A wrote B that he would sell him his farm for $3,000 cash; B replied immediately that he would take it if A would make out his deed and send it to a certain lawyer for examination, and if all right the lawyer would pay him the money. It was held by the court that B had not duly accepted A's offer, because he did not enclose the cash in his letter, but attached a condition to his acceptance.

Should you conduct your negotiations for the purchase of a farm by letter it is essential to know when the contract is completed. It is generally understood that when a man offers to sell another a farm by letter, the moment the other deposits his letter of acceptance in the post office duly directed to the former, the bargain is closed, and neither party can thereafter change his mind, even though the letter should miscarry, or never be received at all. In one case it was held that where the owner of a farm tired of waiting for a reply, sold his farm in good faith to a third party, the party who had accepted the offer by mail recovered damages for non-fulfillment of contract although the letter never reached the farm owner.

As will be readily seen, some curious complications may arise in the purchase of farms by letter or telegraph In such cases, however, some good lawyer should be consulted, since it is almost impossible to lay down a rule of law which will govern them all.

The bargain for the farm having been completed, the next in order is the deed or paper of transfer. This must be in writing, of course, signed by the grantor, with his seal attached. A scroll with the pen, or the letters "L. S." meaning seal, are not sufficient in this State. The grantor's wife ought also to sign, releasing her dower, or at his death she can claim the income of one-third or one-half of the real estate for the remainder of her life. The deed ought to be witnessed and acknowledged by the maker before a Justice of the Peace or a Notary Public; while these are not strictly essential between the parties themselves, it is everywhere necessary that the deed should be acknowledged before it can be recorded, and I would here urge upon every one the importance of recording every paper of transfer of real estate. You may not see the importance at the time, but in future years that deed may prove the one link in the chain of title which your grantee cannot obtain. And I would advise everyone who has an unrecorded deed among his papers to attend to this important duty forthwith.

It may be that the farmer has not enough money to pay in full for his farm. In such a case, having received his deed, he can either give back to the seller a mortgage of the farm, or can raise the money of some third party upon a mortgage.

A mortgage is simply a deed with a clause of defeasance providing that the deed should be void if the conditions mentioned therein are fulfilled. If the mortgagor fulfills the conditions by paying the mortgage debt as it becomes due, he needs simply a discharge of the same to render his title complete.

Should he fail to make the payments, the mortgagee may then foreclose, but the mortgagor will still have one or three years, according as the mortgage may be written, in which to redeem.

Another method often resorted to when the purchaser has little money to pay down, is taking a bond for a deed. In such a case no deed passes to the purchaser, but simply the personal bond of the owner of the farm, that he will execute and deliver a deed, when the price of the farm has been fully paid.

Having received his deed, the farmer next wishes to know how far his farm extends, and what are its proper boundaries. The

intention of the parties will govern in the matter, but it must be the intention expressed in the deed, and this is often uncertain. By far the most important boundary, and one which will control all the rest, is some visible monument, such as a tree, a rock, or a stake or stones, described as corners of the farm. And this will control, although the distances between them may be more or less than those mentioned in the deed, even though the quantity of acres be stated positively and not under the elastic phrase "more or less" so commonly used.

If a boundary line run to a tree, rock, or stump, or by a wall or fence, it passes along the middle of it and not by the side, which in a Virginia rail fence, or a wide ditch might be of some consequence. If a farm is bounded by or on a brook, river or stream, it usually extends to the middle—not of the water—but of the current, or thread of the stream. Should there be islands between that line and the bank, they would go with the farm.

In like manner if the land is bounded on a millpond, or any artificial pond, the farmer will ordinarily own to the center, but in relation to grants bordering on large natural ponds or lakes containing more than ten acres the line will stop at low water mark, the public having rights in such bodies of water for navigation, boating or fishing, providing they do not have to pass over any one's improved ground.

Should the farm be on a navigable river or on the seashore, the line will run down to low water mark, provided that the flats exposed at low water do not extend over one hundred rods, including the exclusive right to gather the sea weed washed thereon by the tide.

Should the deed read, however, "bounded to and by the shore," or by "beach," "flats," etc., the land will only extend to high water mark. But should the expression used be ambiguous as "the beach or sea" or "to the seashore" the farm will ordinarily extend to the low water mark.

One further consideration with reference to a deed should always be kept in mind and that is that a deed passes no title unless it is delivered. A man may make a deed to his wife or son and leave it in his trunk, as has been often done, to be delivered and recorded at his death, but a deed if so delivered and recorded, conveys no title.

Fraudulent statements of the seller as to the boundaries of a farm will release the purchaser from his contract, but if he should state the number of acres fraudulently, and then point out the exact boundaries, he would not be liable.

Fraudulent misrepresentations as to how much hay or wood it will cut, or how much stock it will keep, or how much it has cost, though made with an intention to deceive the purchaser, will not relieve him from his contract, nor entitle him to recover in an action for damages for misrepresentation. Such statements are called "dealers' talk" and the law takes very little notice of them.

The boundaries of the farm having been determined, let us see what passes with the land. The term "land" will include not only the ground or soil, but everything permanently attached to it, above and below, *ad coelum et ad orcum*, to the heavens and to the centre of the earth. The farmer is, however, likely to find less trouble with his fences and with trespassing cattle in either of these directions than from the bounds on the sides of his farm.

This will include all mines, quarries of stone, trees and herbage growing upon the soil, and all buildings erected thereon. The farm buildings, therefore, need not be specially mentioned in a deed of the land, although it is often wrongly supposed that they should be. Should there be any temporary building on the farm, however, built by some third party, with the farmer's consent that it should belong to the builder, it will become personal property, and will not usually pass under a deed of the farm.

As a part of the buildings conveyed would pass also all fixtures, such as windows, doors, and window blinds, even though they have been taken off previous to the conveyance and stored away.

Likewise such articles as mantles and mirrors, pumps, sinks, etc., fastened firmly to the building, but all articles of furniture which can be removed without injuring the structure would belong to the seller.

Standing trees would pass as part of the land, as also trees blown or cut down, if not cut up into wood, in which case they would be personal property.

All growing crops will pass with the land unless especially reserved, as would also all manure. The fences of course pass, with such articles as hop or bean poles if they have been once used, although they may be stored away; but new material, which has never been attached to the soil, or loose boards or timbers which have been laid down but not nailed, may be taken away.

A deed of a farm bounded on a highway gives the farmer the title to the centre of the road with the exclusive right to its use, subject to the right of the public to pass and repass over it. The farmer may, therefore, make use of the grass, trees, stones or gravel of the highway, subject to the right of the public aforesaid, and of the highway surveyor, should he wish to use such material for the repair of the road.

Should the farmer, however, leave piles of wood, wagons or carts on the roadside, and an accident happen on account of them, he might be liable both civilly and criminally for obstructing the highway.

No person has, therefore, any legal right to feed his cattle on the roadside adjoining the farm of another or to hitch his horses there, or to pick up fruit that has fallen upon the ground. And if any man stands in front of your land and whittles your fence, or throws stones at your dog, or uses insulting language, he will be liable as a trespasser.

A right of way may be acquired in three different ways.

First. By purchase.

Second. By long continued use or prescription.

Third. By absolute necessity.

A right of way may be created by deed, but such a deed would convey no right to the soil or anything within the bounds of the way.

If some persons have been using a passage way over your land peaceably and continuously for twenty years or more, under a claim of right, and without your consent, they will have acquired a right of way by prescription and you cannot afterwards prevent them from using such a way.

It is not necessary that any one person should have traversed it for twenty years, but it will be sufficient if successive owners have used it for that length of time. Such a right cannot be gained to wander over a farm wherever a person wants to, and if once gained for a particular purpose its owner would not be authorized to use it for any other.

Should you sell a man a back lot with no means of getting at any highway except over your remaining land, the law gives him a right to cross your land to and fro. So, if you sell him a front lot retaining the back lot for yourself.

Should, however, a way be afterwards laid out touching the back lot, the right of way by necessity would cease. The farmer has

the right, moreover, in the absence of any stipulation to the contrary to erect suitable gates or bars across said rights of way, and if the other party leave them open and cattle get in, he will be liable to the farmer for damage.

Then another right of way by necessity exists. In case the highway becomes impassable from temporary causes The public can then pass around the obstruction, even though it may be necessary to drive through cultivated ground.

### HIRING FARMS.

Many farmers are unable, or do not care to purchase their farms, but prefer to hire them for a term of years.

In such cases the bargain or contract for the farm should be in writing, if the term is for a year or more. This written contract is termed a lease. It is usually made in duplicate, and executed by both parties with their seals attached. It is not necessary that the lease be recorded unless the term be for more than seven years. Every farmer should carefully examine his lease when he takes his farm, or he may find, to his sorrow, that he has agreed to many conditions which he did not intend.

A lease should contain a good description of the farm, the length of the term for which it is to be held, the amount and terms of payment, and should also properly contain clauses regulating the subject of taxes and insurance and repairs upon the buildings.

A clause preventing the assignment or underletting of the premises by the lessee is usually contained in the lease.

A tenant on a farm under a lease will have a right to cut sufficient wood to burn upon the place and for necessary repairs but can not cut and sell cord wood or timber without an agreement to that effect.

A tenant takes the premises as he finds them, and cannot during his term call upon his landlord for repairs or alterations in the absence of any established agreement, but all repairs which the tenant may make must be at his own expense, and he is usually obliged to continue the payment of his rent during the term, even though the premises may be uninhabitable for want of repairs, or burned down.

When a lease expires the tenant may carry away with him all the fixtures of a chattel nature which he has erected on the premises, provided he can do so without material injury to the free-

hold. But this must be done before he surrenders possession, or they will revert to the landlord.

Should the tenant be in possession of the premises without any written agreement from the landlord, he is liable to be expelled at any time upon th rty days' written notice given him for that purpose, notwithstanding any "cast iron" oral agreement he may have to the contrary, except that, where the tenant shall not be in arrears at the expiration of the notice, the thirty days' warning must expire upon a rent day.

### FENCES.

It was the theory of common law that every man should keep watch upon his own animals, or surround his land with fences, not primarily to keep other people's cattle out, but his own in. But years ago the matter of fences was wholly regulated in this State by statute, and adjoining owners of improved land must now maintain partition fences in equal shares.

Should they fail to agree how the fence shall be divided, or should either party neglect or refuse to build his part, an appeal may be had to the town fence viewers.

Any fence four feet high and in good repair, constructed of rail, timber, boards, stone walls, iron or wire (if barbed wire, it should be protected by an upper rail or board), constitutes a legal fence, as do also brooks, rivers, ponds, ditches and hedges, or other things equivalent thereto, in the judgment of the fence viewers. Therefore if my adjoining owner does not keep up his half of the fences, and my cattle get into and injure his crops, he has no redress against me, since it was owing to his own fault. But if my cattle should stray beyond my neighbor's land and into the land of some third party and injure his crops, I would be liable for damage, even though my portion of the fence was good, or even though the third party so injured did not keep up his own fence, and the cattle got upon his land from his own fault, since he is not bound to keep up any fence except against his neighbor. For similar reasons no farmer is obliged to maintain a fence on the road except to keep his own cattle in. If, therefore, a person turns his cattle into the highway and they get upon your land, you can recover damages, but if the cattle are carefully driven along the highway and escape upon the land without the fault of the driver, he can go upon the land and drive them out as soon as possible, and will not then be responsible for any injury done.

A farmer, when he owns land which is wild or unimproved, and does not pasture it, is not obliged to fence it or to be at any expense in maintaining a fence about it, since it is of no advantage to him, but the adjacent owners must keep their cattle upon their own land at their peril.

The law in regard to joint expense of fences doesn't relate to fences between farms and land of railroads, since all railroad companies are obliged to maintain fences along the line of their roads even though the land is woodland and uncultivated.

### HIRING HELP.

One of the first things a farmer often has to do on taking possession of his farm is to hire help.

It is better to do this by written contract, but a verbal agreement between a farmer and his help is in most cases as good in law as a written one, provided it can be proved. In case the contract is not to be performed within a year, however, from the time it is made, it cannot be enforced unless it is in writing, signed by the party to be charged. A minor is not bound by any contract of this nature, whether verbal or in writing, and while the employer may be compelled to keep his agreement, the employe, if a minor, may break his at any time, and collect what he can prove his services were worth, up to the time of leaving, even though he may have looked, or represented himself to be, of age.

A farmer may discharge his help if they disobey his proper orders, are grossly immoral, use insulting language, are frequently drunk, or commit wanton injury to his property, but they are entitled to what they are reasonably worth to the time of their discharge.

Hired help will be justified in leaving a farmer on account of any improper conduct on his part, such as an assault on them, insufficient food or lodging, the prevalence of an epidemic, &c., and can then recover their wages at the contract price.

Sickness of a hired man for any length of time—in one case two weeks—releases both parties from the contract.

The farmer is liable for any contract made by his laborer in the course of his employment. But such a contract must be within the scope of his authority, as for example a laborer who has been in the habit of purchasing the family supplies might buy them in the name of the farmer and the latter would be compelled to pay for them, although the laborer used them himself. But if the farmer

had never permitted him to make purchases, he could not bind the farmer in buying these goods simply by using his name.

A farmer is also responsible for any damage to a third party by any act of his laborer causing an injury, through negligence, fraud or even willful carelessness, if within the scope of his employment, even though the farmer did not authorize or even know of the act, or, perhaps, it was done in direct violation of his orders. But such acts must be done in the course of his employment to render the farmer responsible. If therefore a boy is sent out to burn brush and leaves his work to play, while the fire runs into a neighboring field, the farmer must pay the bills. Or if the hired man in going to the hay field negligently swings his scythe and injures a passerby, it is better for the farmer to pay the doctor's bill and get out of it as easily as he can.

A farmer is not responsible, however, for an injury inflicted upon one of his laborers by a fellow workman in the course of his employment. Every man, on hiring out, is supposed to anticipate any injury that may happen to him from the carelessness of a co-worker and to assume all the risks, but he will not be presumed to contemplate negligence on the part of his employer, and for any injury which he may receive through his employer's carelessness, or through his providing dangerous machinery or apparatus, he can recover damages.

### FARMER'S ANIMALS

A farmer who allows his animals to go loose in the highway is liable for all damage they may do.

Thus, in a well known case, some children playing in a public place began to switch a horse turned loose there, whereupon he turned and kicked them so that one of them died, and the owner of the horse was convicted of manslaughter.

Every owner of an animal known to be dangerous is liable for all injury he may do another, even though the latter be trespassing at the time.

The farmer who put a savage bull into a lot adjoining a brook, to keep fishermen out, saying "The fellow will give them notice enough himself," had to pay $500 for two broken ribs. But this liability depends wholly on the owner's knowledge of the creature's disposition. Without such knowledge he will only be liable for his own negligence in the matter.

In regard to dogs, the Revised Statutes of our State expressly provide that "When a dog does damage to a person or his property, his owner or keeper, and also the parent, guardian, master, or mistress, or any minor or servant, who owns or keeps such dog, forfeits to the person injured double the amount of the damage done; to be recovered by action of trespass. Any person may lawfully kill a dog, that suddenly assaults him or another person when peaceably riding or walking, or is found worrying, wounding, or killing any domestic animal, outside of the enclosure or immediate care of his owner.

A man has no right to kill his neighbor's hens or other fowl, while trespassing upon his land or destroying his crops. His remedy is for damages against the owner.

But because the law is so strict in regard to dogs, do not think you can kill other domestic animals with impunity. Your neighbor's cow or horse, or even his cat or hens, can not be poisoned or injured without rendering yourself liable, even though they have repeatedly trespassed on your land, and their owner has been warned to keep them off.

You may sue the owner for damages, or drive them to the town pound.

Farm animals may usually be bought or sold by an oral bargain though it is better to have a bill of sale made. But a bargain to buy or sell an animal for more than $30 can not be enforced unless in writing, or the creature delivered, or part of the price, at least, paid.

Care should be taken in buying an animal, that the seller actually owns it, for if he does not, the real owner can come and take him at any time without repaying you.

## FIRES.

A farmer may kindle a fire on his land, provided he do it in a careful and prudent manner; but if he, through his carelessness, allows the fire to run onto his neighbor's land, he is liable for the damage done.

If anyone kindles a fire on land not his own without the consent of the owner, he is liable to a fine of $10, and if such fire spreads and damages property, to a very severe penalty, as well as to payment of damages.

### WATER RIGHTS.

A farmer may use what water he needs for his cattle or for domestic purposes from any stream flowing through his farm. He may change the channel of such stream on his own land, provided he does not turn it upon his neighbor's land in a new place. So, he may dam the stream, provided he does not flow back the water upon his neighbor above.

Surface water, that is, water flowing over the surface of the ground, not in well-defined channels, may be obstructed from coming upon his land, or its course changed, and a farmer may change the level of his ground or erect buildings or embankments which will divert surface water without liability.

### TRESPASS ON FARMS.

Whoever, without right, goes upon or crosses the land of a farm is liable in damages for any injury he may do to the land or crops. And whoever enters any enclosure or improved land of another, with intent to take, injure or destroy anything growing thereon, or whoever does take, injure or destroy anything as above, is liable to a severe fine and imprisonment; as he is also if he merely enters or crosses the premises from April to December after being forbidden personally or by a notice posted on the premises.

You may put him out if you find him there, or may arrest him and take him before a trial justice or police court, but may not set traps or spring guns to catch him.

Whoever paints or pastes advertisements on your fences, rocks or buildings without your consent, is also liable to a fine.

### OVERHANGING TREES.

A farmer who has a tree growing near the line of his land so that the roots and branches are over the line on one side, so long as the trunk is on his land is entitled to all the fruit growing on it, and may reach over and pick it; but if the tree stands directly on the line then it belongs to the two in common and neither can injure it.

Should the fruit fall upon his neighbor's land, while the law is not fully settled, the farmer would probably have an implied license to go over and pick it up if he could do so without injury to his neighbor.

The adjacent owner may cut off the branches or roots of the tree up to the line of his land, but cannot use them or he may be obliged to pay what they are worth.

I have thus imperfectly touched on some of the leading rights and liabilities of farmers, and if, in this brief space, I have been able to impart any valuable information or saved you from the many entanglements of the law, my purpose has been accomplished.

## PERPETUAL SUCCESS.

Delivered at Institutes in Aroostook and Penobscot Counties,
By Mrs. ALONZO TOWLE, Freedom, N. H.

There are two questions to-day which seem to vex the serene mind of the farmer's wife. The first is, how shall we in the future perpetuate our success as a farming community, or how shall we establish permanently a class of men who shall be successful tillers of the soil? Some time ago we thought we settled that question successfully. We would send our boys to the agricultural college, and there have them educated in the line of agriculture. This is the very best thing we can do with this generation. But if we begin back far enough in our thoughts, isn't there a mightier dealing power underlying all other powers, a secret agent which explains many of the unexplained facts of the past in the bygone years? Who have supplied our cities and large towns with their most successful business and professional men? Who have filled all posts of responsibility with responsible men? Who have ever sat at the post of love and duty and given to the world the best to be found? Truly, the farmers' wives.

Now, in this generation and for twenty-five years, what has created this restless discontent that has been so prevalent among our young people—what has caused this heart-rending ambition to strike out here and there for something they know not what? I answer you by saying that it was transmitted from the mother. The mothers and the great-grandmothers who settled upon these hillside and valley farms, were women who were contented with their lives. They were far removed from the centres of civilization; they knew little of the world, and they cared less. The height of their ambition was to do their work, and raise their large families of children. Peacefully they lived; peacefully they died.

Then came the transition period. By steam and electricity we were brought face to face with a different civilization; city and country were brought together; country women began to see that there was a condition of culture they had never attained, and never could, because of their conditions. Then began a life of discontent and repressed ambition that must be borne silently, and that restlessness has become stamped upon her offspring; hence, a race of restless, unhappy spirits.

What we desire is to raise a class of men who shall look upon our broad fields with satisfaction. Can this be done by education? Not wholly; it must be born in them, and ground into their very blood and fibre.

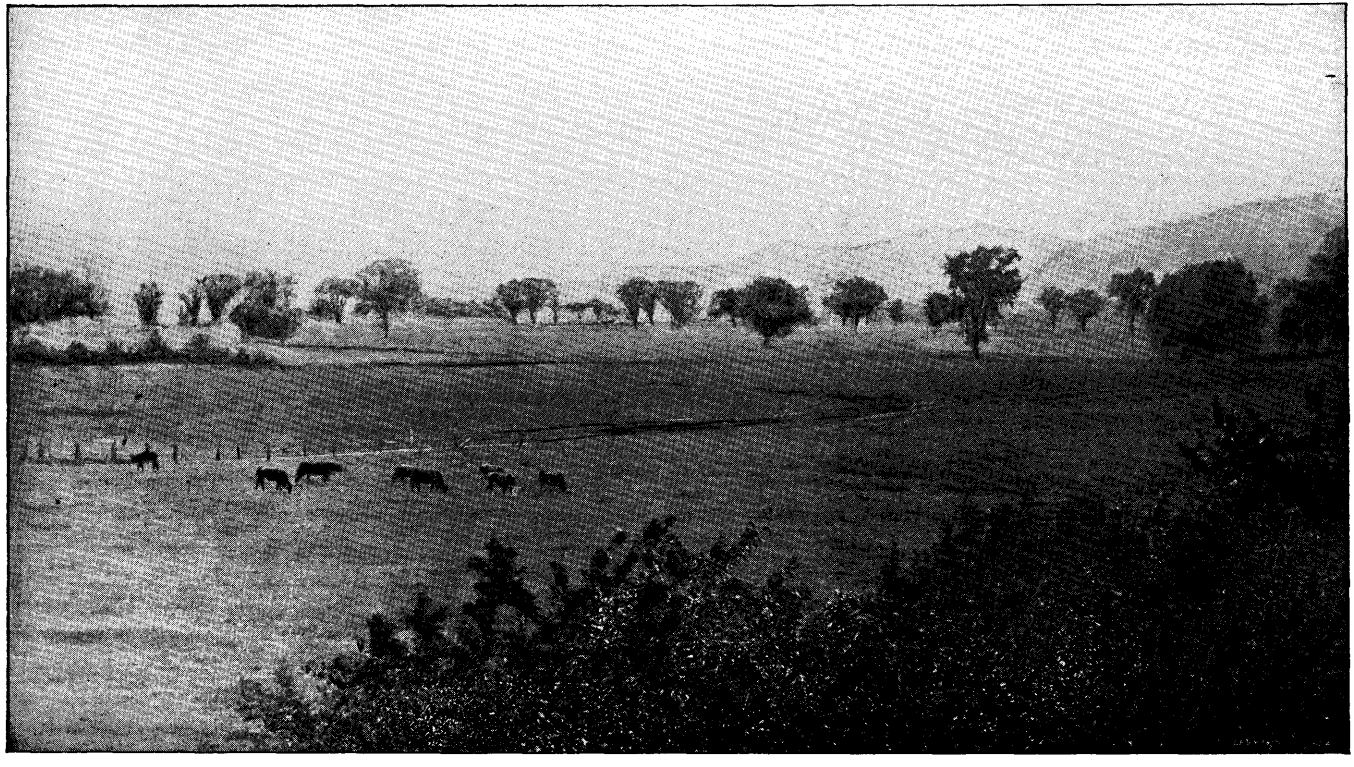
How can women who are tired and sick of farm life, weary of its drudgery and its care, give pre natal nourishment to a class of men who shall have a love for the farmer's occupation? During the first five or ten years of a married woman's life she is doing her most telling work. She is raising her family of children, and is the least fitted for it during that time. She has neither physical strength, muscular force, or practical knowledge; she is herself a student during all those years. What is the cause of this? Young girls, as a rule, marry with scarcely any knowledge of what their duties are as housewives or mothers. They think they can get through—housekeeping for two does not amount to much; but they soon find that there are cares and emergencies which they are wholly unable to meet. Traits of character develop in both themselves and the other members of the family that they never recognized before marriage. As cook, the hand is not as deft as when she stood beside the good mother, who helped, out of her many years of dearly bought experience; and even with the mother, there has never been methodical training. It has always been haphazard in the most responsible part of woman's work, a guess work. Now, what are the results? Well, a part push through, and we call them our best housekeepers; but if they were to give you their verdict, they would all say, that if they had begun their lives with the knowledge they possessed at the end of ten years, ten years more of happiness would have been given them. Another class get discouraged and give it up entirely. The third class keep on making mistakes day after day, the same to-day as they did yesterday, the same to-morrow as to-day; and by and by the little children begin to fill the vacant places at the table, and their pallid, dyspeptic faces show

how a hidden evil is surely and silently at work undermining their health, rendering them unsuccessful through all their future life. This poor mother looks back into the past with sorrow, and into the future with fear. She knows there is trouble somewhere, she knows not where. It is said to-day that woman is the greatest force in our moral and spiritual lives; but when she stands at the moulding board in the capacity of cook, she is wielding a power as mighty, for she is dealing out to those she loves best, either those things which will make them strong, healthful, happy and successful, or which will make them wretched and miserable. How many ties have been severed, and how many hearts broken, because this king of our physical being, the stomach, has rebelled! How many men have been sent to their cups and a drunkard's grave! How much of sin, and sorrow, and misery! You will never know until the great reckoning time comes. Many women of the nineteenth century are seeking for a mission; but here is a sphere so broad that it covers the whole earth, reaching even to its remotest corners.

Now, what would we have? A thorough, scientific household education, going hand in hand with physical training, giving girls a chance to understand what is expected of them; also, a way to find some sweetness and pleasure in life, as they deserve, teaching them how much depends on them of the life and morality of society in which they live.

If the farmers and their wives will attend to this the door will be opened to all the possibilities of a New England girl's life—health, happiness, and knowledge; and you will also have settled a class of women upon your farms who will be contented and happy; and they will raise contented and happy children, perpetuating their own qualities of content and happiness.

The other question that is perplexing the farmer's wife to-day is, how shall we obtain help upon our farms, help in time of need, help in time of sickness—help, that the farmer's wife may have hours of rest, hours for recreation and improvement, as well as her husband? You hear the farmers and their wives scolding and complaining because the girls will not take up with this question of work, saying how foolish they are to do other things and not this thing. But girls will tell you that the unpopular position of house girl, to-day, keeps most of the better class out of it. One reason for its being so unpopular is because we have allowed it to drift into the hands of those who have neither practical knowledge nor



PASTURE ON BRADLEY FARM, FRYEBURG, WITH INTERVALS AND SACO RIVER IN THE DISTANCE.

mental aptness. The most artistic work and most respectable calling may become debased by being done year after year in a way that always needs supervision or else is slipshod.

What is the remedy? Systematic training is a positive necessity. I speak not only as a country housekeeper, but as a city housekeeper who has had experience, when I say that the lack in housegirls is want of responsibility and thoroughness. They have not been trained to self-confidence, steadfastness or perseverance. A system of industrial education that will compel all girls to know how to do something and do it well, is the only remedy. It is also the only way to save the poor and dependent, because in stores, factories, and public places at large, there is safety only for a few of those who, from their superior qualifications, hold superior places. Their remuneration is so small that they cannot long live respectably. The best gift that a state, city or town can make is to proffer them a system of industrial education. But, you say, it costs something. It does not cost as much as it does to take care of them as inefficient help, paupers, criminals and lost women. Suppose it does cost something; are we not under some obligation to the All-Giving Power? Are we unwilling to make a small return for the large benefits we receive? From whence comes our prosperity, from whence water, fire, electricity, and all the natural forces? Who buried the coal down deep in Mother Earth, waiting the coming of man? Who secreted the gold and silver in tiny threads until a nation's wealth has been taken from earth's veins? Generally man's inventive genius and industry have accomplished much, and he who works should receive wages. But I see the possibility of a higher plane of thought and action where, "he who sows and he who reaps shall receive wages that they both may rejoice together." Not that we ever expect to see the day when there shall be no lazy people nor inefficient ones. There always have been such, and always will be; but they will not be quite so lazy nor quite so inefficient as they would be if left to themselves. I believe that the only true way to temperance and sobriety, to chastity and cleanliness, is in teaching the young in right living and right thinking, teaching them habits of industry and efficiency. Some people, even at this late day, tell us that universal education of any kind is a failure. They thrust into our faces that old Malthusian doctrine that people were born in guilt, and you never can make them any different. They forget that civilization and refine-

ment, that has raised many to a high level, has also brought others to where they may be reached for and brought up higher still. What we need is a thorough practical training for our young.

I believe this the *only* true way to success. Why are China and the Chinese in the condition they are to day and have been for centuries? Because of her isolation and aversion to progress. Why is India wallowing in the degradation of heathenism and idolatry? Because gross ignorance has been her inheritance; a degraded and debased womanhood has been the mother of her people, and influenced them in childhood. A very ignorant and degraded womanhood can produce only a weakened, debased, and degraded manhood. Why is the bloody Turk heralded all over Christendom as a monster of cruelty? Why has France been the scene of questionable society? Because of the moral atmosphere of woman. Where in all this world will you find the noblest race of men? Where women have the most independence, and are the best cared for. You know where that is. It is our dear America. One eminent English writer says, under the heading "America's Social and Economic Future," that she has stretching out before her a long vista of years in which she will enter into conditions more auspicious than any European country can ever count upon, and that her present marks a higher level of well-being and happiness than any other nation has ever attained. We know this to be true; and yet we have not arrived at a condition of perfection. I believe, also, in the influence of heredity, not in heredity of blood, for there is no blood but has black spots in it, but in the inheritance of temperance, good habits, right training, education, deportment, from mother and father to child, onward and onward, perpetuating the effects of right living, and that the boys and girls of rich and poor should be trained to look upon labor as honorable, and upon idleness and inefficiency as dishonorable. They should be taught that the only true nobility and aristocracy is the nobility and aristocracy of the intelligent industrial classes; and be taught to shun this cankering disease of shoddyism that has been gnawing at the vitals of society so many years.

Victor Hugo said, "This is the age of women," meaning that women are being thrust more into the world than ever before, and that more depends upon her work than ever before. As I have said, our way to success lies through the lives of our girls, principally. They should be taught that they are responsible women;

that through them the world will either be cursed or blessed. But you ask, have not the future fathers any responsibilities? Let us examine for a moment where their duty lies. Men tell us that we should be faithful wives and mothers, and that there is nothing so beautiful as woman in her own sphere, the mistress of the household, performing her work zealously, caring for her husband's welfare and her children's interest. How was it when as young girls they wooed them? Did they encourage them in this direction, or did they admire their fair curls, their slender, tapering waists, and their accomplishments? How many men married their wives because they had wisdom to wear their clothes as God intended they should? How many married them because they bore the insignia of industry upon their hands? How many for common sense and every-day life? We expect girls to keep the morals of society but they will be what the young men of the period expect them to be, as far as attainments and acquirements are concerned. They cannot help it; they have always been the objects of circumstances, and they will continue to be to the end of time, whatever is said to the contrary.

We would not devote our whole thought to our girls, for this training is for those only of the present generation and does not affect those already farmers' wives. As a class *they* do need many words of encouragement and cheer. They have been referred to all along the line as those who are the wives of nothing but "common farmers," as though this appellation was enough to ostracize them. With this has been a certain amount of condescension toward many who had not the courage to meet it on its own ground. Then, owing to their isolation and absorbing cares, they are apt to drop into ruts and routine, forgetting themselves and their obligations to the world. They have not been, and are not now, ready or willing to grasp the many helps extended to them for their good. Owing to many obstacles in the way, they are likely to give up, socially sickened, but not unto death. In each of these conditions the person who plants courage in the heart is the best physician. While others have been complaining and wailing, farmers' wives have held their peace, repressed their ambitious thoughts, much to the harm of the generation following.

While we believe that every woman has a large sphere, all her own, to work in, and we would have a thorough housekeeper and home-maker, she also has rights and privileges, as well as duties,

peculiarly her own. She should be the first object of interest with the husband and children, for they are wholly dependent upon her in every way. She is and always has been the burden bearer of the family, the vital principle in the home-life; when her light goes out, my children, your home-life is ended. She should be ever solicitous for her own physical well-being. Should zealously guard her own health; without this precious boon woman's life is but miserable in the best situation. As workers, we should strive for the happy medium between indifference with slovenly habits and the other extreme of fussy detail, that so plays upon the nerves, until we are no longer responsible beings. For we would have woman deserve her merits as well as preserve herself. Inertia means death, not preservation, so a constant demand upon our physical members will in the end have the same result. Hence the necessity of our striving to strike the medium. Work of a proper amount is strengthening, worry is waste. Work wisely done causes growth, worry hinders growth. Some work and worry at the same time. You must stop this if you do not wish to grow old before your time, besides losing the happiness which may be yours every day. Stop it! How? By your own efforts, working in unison with all good and true influences from above and around. There are many things we worry about which do not amount to much. You have seen some women fret over a trifling affair that wasn't worth even mentioning. You have also seen that same woman do heroic deeds in the time of need or dire calamity, that no one could do unless possessed with a self-sacrificing and courageous spirit. You have seen her in the sick room by the side of the dying and the dead, administering to those suffering from the infirmities of age, and caring for the young and helpless, doing all with the courage of a true soldier.

What does this tell us? That because of her fine organization, her peculiar duties and occupation, she needs ever in her mind the presence of some great thought or object in life, to act as a counter-irritant upon her sensitive nerve centers, helping her to maintain a neutral equipoise, keeping her out of the mire and dirt of every day worry and fret. Real brain work is what we need, regularly and persistently carried out until these refractory nerves are subservient to the will power. There are many things that the farmers' wives may take up as a central thought, for one we must have. Books there are on every side, we may avail ourselves of any or

all we please. Select some subject and follow it along the line—scientific cookery, chemistry of food, hygiene, adulterated foods—the many subjects directly appertaining to the farm, botany and geology, which will make us love our country homes more and better; music, painting, drawing, missionary work of all kinds, in fact anything that will elevate our aims and beautify our lives, keeping us from the monotony of routine, which is almost sure to develop morbid thoughts and fancies with disease following in their train; keeping us from those habits which are so prevalent in country places where everybody knows everybody's business and is much inclined to talk about it.

Beside books to be studied as studies, there are so many other good books, pleasant and helpful, that everyone may have their choice. When we are tired and feel like fretting, let us stop, it is because we are tired and have allowed ourselves to drop into a habit, perhaps. Give the physical muscle a rest, and the mental a little work. Not too long, as we may overtax the mental or neglect something. If we are situated so that it is impossible for us to stop, no matter what our condition is, then here is the place that demands that Balm in Gilead of the Great Physician. How many times and how often, when we feel we are utter powerless to act futher, does our urgent necessity become the Good Father's grand opportunity to teach us His divine power and helpfulness. And in this way, my sisters, using our own power of judgment and self-control, disciplining ourselves as we would discipline another, seeking wisdom and help from that Book of Books, we may feel that we are on the way to a strong and hopeful matronhood, at last, if permitted, to be crowned by a lovely old age.

No nation upon earth gives woman such liberty of action as our own. Americans point with pride to the position of women in this country as an evidence of our high level of civilization. Still there is a cry going up from some for a broader sphere. We have nearly the "whole earth and the fulness thereof," now, is there anything more for us? We cannot tell just yet. If we will take what is already ours, make the most of our present opportunities for our own improvement, the future will be much safer and bring us a much larger share of happiness and success. Consider what has already been done. When Cæsar landed in Britain, 55 B. C., he found the land inhabited by a class that we will call savages. One hundred years later, women were like wild animals, in their savage

ways. Then came the German, the Anglo-Saxon followed—heathen tribes who fought each other like wild beasts, below the Briton in civilization. The Romans looked upon them as we look upon the negroes of Central Africa to-day. There is not very much to be proud of in our remote ancestry, our ancestry minus the civilization of Christianity and the effects of mental development. It is said that an Englishman of to-day, even cannot consult with a woman upon business matters, or anything of importance, without feeling his condescension. He considers himself superior, simply because he is a man, and talks down to her. It is not so with Americans, or it is not so with a well bred American. He weighs them all mentally, both men and women, takes what they say for what it is worth. English ladies are our superiors in politics. They canvass at all the elections, talk politics, and are well informed. We have not come to that place in our history, or in the evolution of events, where we have time or inclination to do either. Yet, brothers, if you see that wife of yours consulting the periodicals of the day in regard to the public issue, some of you are troubled, and you keep "nagging" because some women are talking about liberty and independence There are two sides to every question. We who are not ambitious in certain directions keep asking, "What's the matter with the women of the nineteenth century?" Let us see if we can find out. What sent our forefathers to this country? What caused them to brave old ocean's treachery and seek a path across an unknown deep? They loved and longed for liberty of thought and action more and better than they loved their lives or their homes. It was the incentive to every effort. It opened a fountain whose streams have coursed their way down through succeeding generations, gathering momentum as the years have passed What's the matter with the woman of the nineteenth century? She is feeling the drum-beats of '76—those of old Lexington, Concord, and Bunker Hill—rebeating and pulsating in every heart's throb. "Give me liberty or give me death," has become engraven upon the brain and infused into the blood of your mothers, wives, and sisters, as well as into your own. And why not? Were they not born and bred by the same people, subject to the same conditions, influenced by the same motive power as an incentive to action? Then cease blaming women for those tendencies, those habits of thought and action which the blood of her ancestors and the conditions of the times have imprinted upon her without her

sanction. Let her alone. Right will be triumphant because God is just. Do not be afraid of the ballot box Make of yourselves such kind, loving and appreciative husbands, that your wives will never wish to leave your side. For no matter how much is hers, of knowledge, of development, and of everything this world can give, if you who were her heart's best choice will but be kind, tender and true, no power on earth can usurp yours. On the contrary, if you choose to be the opposite, the woman of the future will have avenues of happiness in her own mentality, which no one can take from her.

Of the future in other directions we can not speak. The signs of the times indicate some things, but our duties lie in the present; to make the most of life, to help others as we have opportunity, to be content if not satisfied, full of hope and cheerfulness. We have learned enough of life to know that no matter how much we may be opposed to measures and acts now, we may change our conclusions of thought in the future The only unchangeable and everlasting truth is God, and those virtues and laws emanating from Him; all other things—customs, habits, human laws, and our own ideas—are all continually subject to modification and change. So it will be safer for us to prepare for a future of wiser and perhaps better days. We should also rejoice together that we are good New England Yankees, to be which, as an agricultural people, is to be envied as far as all things that make life worth living are concerned. When compared with any other country's farming people, we realize this truth. In England they exist under entirely different conditions; in Southern Europe their condition is growing from bad to worse. I repeat. when we compare our condition with that of any other country's, we can but feel that with all the short-comings of men, and the imperfections of their deeds, that this, as a Republic, has the most substantial foundation, the most trustworthy superstructure. We should, particularly, be proud who claim for our home this picturesque old New England, where the sun rises over mountain peaks that are twin sisters to the clouds, where the rosy sunsets are reflected from myriads of lakes that speak peace to the soul. Where old Nature triumphantly hurls obstacles in the way to hinder her sons and daughters, and to make them staunch, persistent and reliable. Let us be glad for the conditions and gifts, remembering with them all, that there is

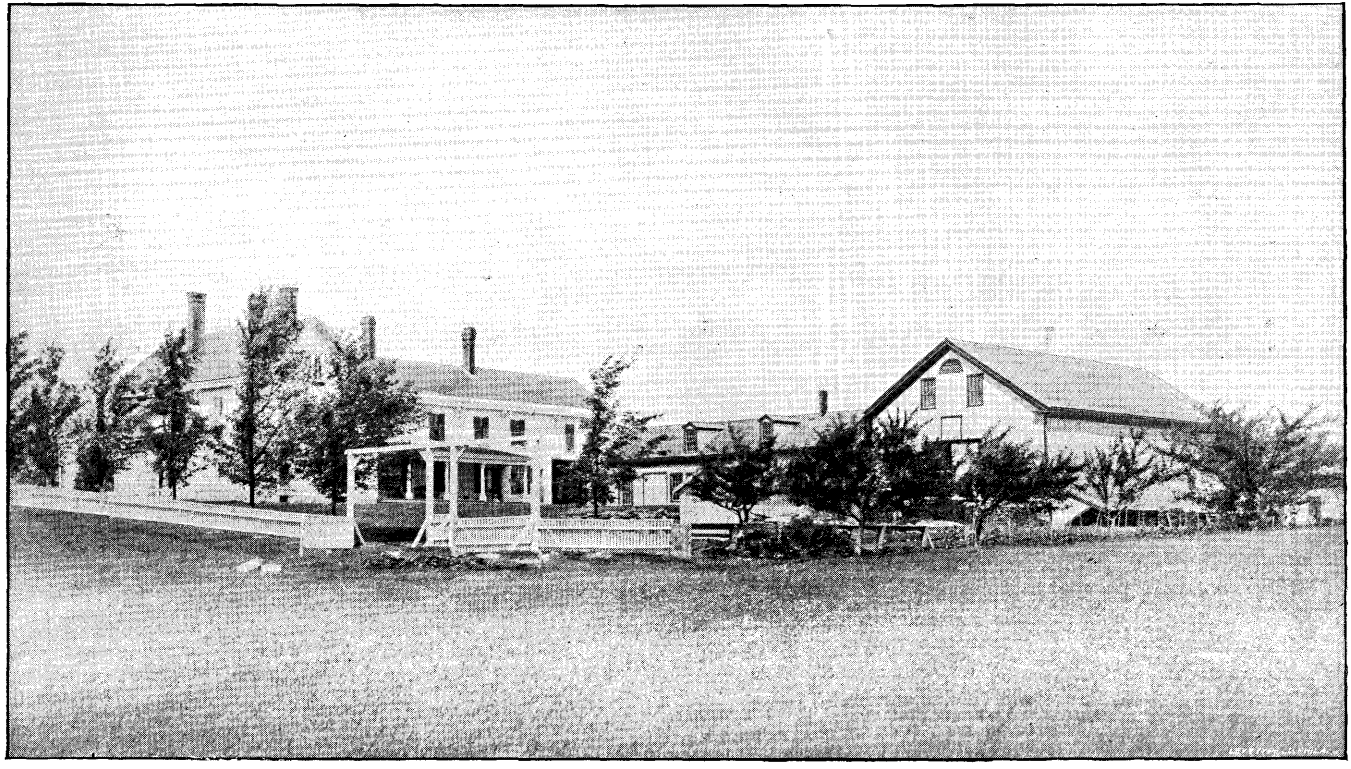
but one lasting happiness—duty; there is but one natural consolation—work.

As citizens, remember that wherever there has been a successful civilization, there has been deeply rooted morality. When luxury, silliness and high-headed ways have crept in there have followed licentiousness, lawlessness and corruption. Then the path was downward until mother earth in pity has often covered their shame from human gaze. As we teach girls the worth of pure living and expect them to alway hold aloft principle and truth, so let's teach our boys that a dishonored citizenship is as much a shame to man as dishonered womanhood is to woman. Political corruption has always been followed by spiritual decadence, for very few dare take the name of the High and Holy One upon their lips while upon their conscience lies a blot and in their pockets ill gotten gains. When we are politically corrupt and spiritually weak then is our success arrested and we begin to die.

## TALK, BY HON. W. D. HOARD, AT MANCHESTER, ME.

*Mr. Chairman, Ladies and Gentlemen:* I am not exactly a cat in a strange garret, for I have associated a great deal with Maine people in Wisconsin. They say a Maine man will smell the pine tree from afar off, and northern Wisconsin is greatly benefited by the energy and enterprise of the people of Maine.

I have had a very interesting week, one which has been very productive to me along the lines of that which has been to me for over thirty years an interesting study. I have been brought into contact with experiences which have instructed me, and I find that no matter where I go or with whom I associate there is something to learn. I have an idea that the old Bible as well as the new, contains very much that is of importance to learn on the dairy question. Christ said, "Except ye become as a little child ye shall in no wise enter the Kingdom of Heaven." I find that applies to the kingdom of agriculture and to the kingdom of science, particularly to the kingdom of dairying. Except a man becomes teachable like a little child he shall in no wise enter any of these kingdoms. One important branch of our study lies in animal husbandry. To be sure we have to study plant life, but plant life also involves maternity. The finest corn grower I ever knew, a man who had the deep-



HERRICK FARM, ORONO

est understanding of the corn plant, gave me the key to the existence of the cornstalk.

He said the object of the existence of the cornstalk is the production of the ear; it is a kind of maternity. He led me into the thought in that way. The object of the life of the stalk is the production of the ear, and unless the ear is produced the value of the stalk is limited. That the feed value of a stalk producing an ear is vastly better than one that is not. And so he led me up along the line of this thought.

Now we are to talk a little while this afternoon upon one branch of dairy husbandry. I take it that you are, both men and women, all interested in dairy matters. Now I come to you from an environment somewhat different from this. I come to you from a section of the country that is densely populated with cows. The town of Koshkonong, Wis., where I live, has a cow population, if I remember the figures of the assessors correctly, of nearly 5,000—a town six miles square. We have, my son and myself, eight creameries in actual operation in a territory of ten miles in area. This does not represent all of them. We handle, ourselves, nearly $300,000 worth of milk a year; so you see ours is a dense cow population. Now I take it, the problems which confront us are the same in Wisconsin as in Maine. In the first place, we have the same temperature, the same climate. A climate corresponding almost identically to yours. We don't have the same soil; that is a problem easily adjusted. The question of the cow, her breeding, is the same. To produce a profitable cow, the problem is the same in Wisconsin as here. To correctly house a cow, to handle her and manage her, is the same there as here.

I will talk to you a short time along the distinctive feature of handling cows, leaving the question of breeding and feeding entirely out. I start out with the proposition that handling is the most important thing connected with the cow after she is born. The question of her being born is a question that belongs to breeding. I heard Bishop Foster once say in a Methodist conference, it was a magnificent encouragement to a Methodist to be well born. That he had always noticed that a good Christian as a rule was well born, and if a man was born viciously it was a discouragement to his Christianity all through life. I guess he was right. If a cow is born well, right birth, right antecedents, is all there is to this question of breeding, and it insures a concentration of power and

capacity in given directions. To do this we have to draw largely on the past. A cow breeds not from her performance but the performance of her ancestors. It depends upon the good mothers she has had as to her calf and not so much as to what she is herself. We should start with a good heritage in straight lines for dairy cattle. A dairy function is based upon a dairy temperament. A dairy function is what we want, the function of profitable milk giving. It is a question of heritage just as much as speed in a horse, just as much as scent in dogs, just as much as wool in sheep, just as much as any peculiarity in the animal creation. Therefore a profitable dairy born calf is supposed to be assumed in the first place. After the calf is born, indeed I might say before, for the humane and kindly actions of the man who owns the mother will have much to do with the character of the little life that is to come to bless and comfort and to profit him to whom it comes. But after the calf is born, and we suppose it is born rightly, that it comes of a good dairy temperament and antecedent, the first thing is to raise it rightly, to feed it for a cow, handle it for a cow.

Therein lies the first principle of handling. Dairy cattle must be handled differently from any other cattle. You should not handle a dairy cow as you would a beef cow. Because first, milk giving presupposes a relaxed condition of the system, whereas in a fattening bullock there is a total change, a total difference in constitutional character and temperament. Let me illustrate; I have seen for instance, on the prairie of Illinois and Iowa, steers in herds of 100 to 2,000 being fattened. I have seen these steers go out and lie down on the snow, so full of heat, so full of carbon that it was a relief to them to lie down on the snow. Did any man ever see a cow giving milk seek the north side of the barn when the sun shone? Did any man ever see a cow giving milk do anything except seek the warmest, cosiest corner she could find? Why? Because milk giving presupposes a relaxed condition. The application of warmth promotes relaxation of the glands and cold contracts them. You can determine the future character of a heifer very much by your handling of her and managing of her. First under no circumstances feed a heifer calf to the promotion of flesh. Do not under any circumstances allow a heifer to fatten. Keep her thrifty, just enough so as to promote a good thrifty growing condition of the body. You can destroy a heifer calf, and I will give you this instance. What I have learned has cost me a good deal of money,

much of it has been in the way of experiment. I have sacrificed animals for the sake of arriving at conclusions. I had a very fine Jersey cow and the first calf she gave me was a heifer. I took it and handled it as I thought correctly. It grew up and made a fine cow. Her second, third and fourth calves were heifers and the fifth a male. I wanted to see the effect of vicious handling on one of the heifers. The first calf I handled rightly and she blossomed right out and made a fine cow. The second calf I thought I would handle badly and see what effect it would have on her future. So I commenced feeding her gross food, that is corn meal as soon as she could digest it. I soon noticed in her the formation of a lymphatic temperament. The result was, when she became a mother she gave me a very puny calf and also gave me but three or four quarts of milk and then became barren, ruined, spoiled and was never worth ten cents. The third calf, her sister, I handled just as I did the first calf and the fourth calf I handled the same. All proved to be good cows. Here was a clear illustration of the value of handling. What did I do with these calves, these calves that I handled rightly? I fed them upon skimmed milk after the first eight days with a little ground flaxseed given to them in this way: Take a half teacup full of ground flaxseed, put it in a pail and turn on boiling hot water till you get half a pail full of mucilaginous mixture. The calf gets a little of that in her milk given four or five times a day, until she is six weeks old. The reason for frequent feeding is this: If a calf runs with her mother she will suckle from ten to twenty times a day, she never gets scours, never gets dyspepsia, never gets pot bellied. No calf does, that runs with its mother. Why? Because it never takes a sufficient amount into its stomach at once to cause it to distend. It also takes its food warm and sweet. Nine out of ten farmers in this country feed cold milk and feed it half way sour, and feed it twice a day. Could man under any circumstances violate the digestion of the calf any more than they do? Any mother in the country knows better. I would like to trust the calves of this country entirely to the women of the nation. I will guarantee to the men in less than ten years it would alter the capacity of their cows if they would relinquish the calves entirely to the mothers of the country.

In Holland the cattle are handled entirely by the women, one mother caring for another mother, hence the cows of Holland. It is the same with the island of Jersey and the island of Guernsey.

It is the women of these countries that have the handling of the cattle. Men are stupid; my wife declares that to be the case from her personal experience. I tell you men are stupid when it comes to handling cows,—and women. Not one in a hundred have any clear understanding of this question of motherhood, and gentlemen, your dairy interest is based upon that one question, and just as you conform to its demands and its laws do you succeed with this bovine mother. Now the calf is given its food. I feed it skimmed milk for the reason in that way I promote the growth of the animal and don't promote the tendency to fatten. Then I say I feed it warm, under no circumstances would I give my little calf its milk at less than blood heat. Again I feed it often, I insist my calves shall have their milk four or five times a day, and I go to the trouble to see it is done. But almost every man says this is too much work. I am here to swap trouble for money, I am here to swap labor for money. I can put money into a heifer calf more profitably the first year of its existence than any other time in its existence. I am sure the character of the little animal is to be determined very largely in the first two years of its existence. So I give the food, sweet, often, and warm. I have had only one case of scours in twenty-five years and that was brought about by the stupidity of a hired man who would not do as I wanted him to do, the result was, he brought me so much of that nuisance. I have had only one case of milk fever. I lost a thoroughbred cow that I valued at $300 by the stupidity of a man when I was absent. I had always avoided it by close attention to the principles of motherhood.

Now let me add one word to the matter of handling. You can modify the effect of the food by the handling. You can modify the effect of the food by the environment but you cannot modify the environment by the food. Let me illustrate. You may give a cow a splendid ration and turn her out in the cold; the cold will modify the effect of the food but the food will not modify the cold. A little calf to start with requires certain management. As she comes along up let her always remember that man is her friend, her protector, that the man she loves is a man full of tenderness and chivalry. A man that is chivalric to woman but not to others around him has learned only half the lesson of chivalry. Then when she comes to her first motherhood, let this little animal be constantly handled, let her be talked to almost every day. Let her little udder be handled every day. You can make a great difference in the

character of that coming udder. It is very important to you, it is the milk vessel. You can make a great difference in the character of that coming vessel if you handle the little animal previous to her motherhood and then when she comes in milk you will never have to break her. I hired a man once to care for my Guernsey cattle. I had four young Guernsey heifers come in milk, and he said: "I never saw such heifers, they are just like old cows, not one ever raised a foot, every one acted as if they had known this business all their lives." I was glad to hear him say this for it showed that the carefulness with which they had been handled. Now then, when she comes in milk, she should be milked just as long as possible after her first calf. Even carrying her almost up to her second calf. This is to establish in her a long milking habit. It is very essential. You will establish the habit in the heifer for all life in seven cases out of ten by the way you handle her in the first milk form. Now then, we have got the little heifer started, so far. I said to you that warmth is essential to motherhood, my wife taught me that,—my wife is the mother of three stalwart boys, and she has taught me more wise lessons along this question of maternity than all the books I have ever studied. She was the first mother that I ever questioned or could question concerning the operation of those laws that governed this other mother that I could not question. I come before you a firm believer in the fact, as I told you a moment ago, that the cows of our farmers in Maine and Wisconsin would be 100 per cent better off if they were in the hands of the women of these farms. I don't know any reason why a man can't manage these matters well. I only know that most men are averse to small details and say they can't afford to putter. A man who is not the son of his mother more than his father had better let cows alone. He needs a very humane spirit, a very patient spirit and a very Christian spirit. The handling of a little calf is very trying to the patience. He is a stupid little animal and don't understand why this or that is to be so. He has to be taught, and once in a while the Christian spirit gets a little weak and the old Adam gets a little strong when trying to teach a stupid little calf.

I think I will relieve the tedium (?) of this talk a little with a story. I rarely tell this story and when I do it is about this time. Near where I lived in New York lived the kindest hearted old man I ever knew. He was a deacon of the Baptist church. I must say I don't think the Lord ever let a better man live. He was not so

profound in doctrine, but he abounded in good works. I would rather have that a hundred times over. The old deacon had just driven the old mare out on the road to go three miles to church when his wife, who was equally as whitehearted woman as he was a man, said, 'Oh dear, what have we done?" The deacon was quick spoken, "Well, what is it we have done?" "Here we are going to church this blessed Sunday morning and there is that poor little calf that has not been fed. The milk is in the brass kettle on the stove, and you must feed her." "Well," said the deacon, "this is a nice time to take to feed a calf, why didn't you speak of it before?" He said, "Well, here goes." He started and takes the brass kettle to the calf and then he inserts his two fingers in its mouth. You know there is a good deal of sustenance in a deacon's two fingers. He pushed its nose down to the milk but it got its nose under the milk and suddenly gave a snort and covered the deacon with milk. "Oh dear, I knew it would come to this; I am in a nice fix." "Moolly, moolly, bossy, bossy," then he let it down the second time and there came another snort and he could stand it no longer, so he straddled the calf's neck, seized her by the ears, drove her head into the pail, and exclaimed, "If it was not for the love I bear my blessed Lord and Master, I would punch your damned head off." That was not swearing, but it was just as near it, as the church uses it sometimes in anathemas. I never thought he had any right to use it on the poor calf, but I always believed that the old deacon was sorely tried and the recording angel understood it. I presume every one of us have had this experience ourselves. Nothing on this earth will so try our patience and Christianity as a stupid little calf that refuses to learn to drink.

We have gone along and have brought this little heifer up to her cowhood. Now comes the question of her management as a cow. Now there are certain things in this northern climate which we must do. We must house our cattle at least two hundred days in the year; in many instances, more. We must make provision for food and comfort. I wish I could write this word, COMFORT, over every cow stable in the land. I wish I could make you understand what I mean by the comfort of the cow. For this reason I appeal to your pocket. I am not appealing to your Christianity, because I don't know anything about it; I am not appealing to your pride, because I don't know anything about that; nor to your tenderness, I know nothing about that; but I am appealing to the dairyman's

pocket. I know he has got a nerve in his pocket, as sensitive as any other man. I want you to understand this word, "comfort," from a pocket standpoint. You make merchandise of the maternity of the cow, you sell her comfort and she will return you money, in proportion to the intelligence spent on her comfort.

First, a warm stable, one in which the manure never freezes, I don't care if it is forty degrees below zero, for just the second you have carried the temperature down to thirty-two degrees you have reduced the milk giving power, the power to secrete milk, in that cow; and so have taken the profit out of your pocket. Lumber is cheaper than loss, and we should always see that the cow has a good degree of warmth. We must warm our stables with the heat of the bodies of our cows. Consequently we are compelled to do some good thinking and some good reading in order to put ourselves in current of the largest amount of discussion and study on that question that we can. We are apt to have an idea that our notions are just as good as the knowledge and convictions of the world. But they are not. For, with farm architecture, stable architecture and barn architecture there has been a splendid advance in good building during the past ten years. But such improvements are confined to a farm here, and one over there ten miles or more apart, while the main body of men who keep cows are pursuing the very path their fathers pursued before them, without any knowledge of such improvements. Then there is the change in our climate. In many particulars it is becoming more trying, more changeable. The summer becomes droughty and the winter severe. There is need of a thorough study of modern experience all along these lines if we look for profit.

You are selling the comfort of the cow, not your own comfort; therefore, promote that comfort, secure that warmth. Do it by building your barn very cheaply and at the same time thoroughly. How much will it cost a man when he is setting up a barn to give that barn a coat of building paper. Line the outside with building paper and then nail up and down each studding inch thick strips, and go over that with another coat of building paper. It will cost you comparatively little and there would be formed two air chambers which would warm that building wonderfully. I have seen cases where the making of a single air chamber of building paper would raise the temperature ten or fifteen degrees in cold weather. It is a permanent investment enabling a man to draw from his cows every

winter a handsome milk interest on his money. Money is worth no more to you or me than just the interest of it. I have known men to refuse to go to the expense of $100 to secure a suitable stable, the annual interest amounting to only six dollars, and if they had done so the profit would have amounted to $50. Now that is "penny wise and pound foolish." I would promote the comfort of this cow still further with the ventilation of her stable. It is (not?) a hard matter to ventilate stables better at least than we do. One very serious fault we have is to crowd too many cattle in one stable. Lumber and good dairy sense is cheaper than tuberculosis, and cheaper than a good many things that poison the blood of the cow. Every cow should have eight hundred to one thousand cubit feet of air. It does not cost much to put a ventilating shaft six or eight inches in diameter from near the floor up through the roof. If you insist upon putting the hay up over your cows, which I don't like, it will not cost you much to put this ventilating shaft up through. Set it about two feet from the floor of the stable and insert a sliding damper because sometimes the current comes down the wrong way and with this you can regulate it.

What does land plaster or gypsum cost you here? Six dollars per ton? It costs me fifty cents per hundred, ten to eleven dollars per ton. I would no more be without it in a stable of cows than I would be without cows. It is worth to any man twenty dollars per ton if they would use it in the manure, as an agent to hold the ammonia, till it goes into plant food. I hear you discuss fertilizers here with a good deal of zeal and interest, yet nine out of ten farmers in Maine and elsewhere, allow the ammonia from their manure to escape. It should be preserved. If the floor in the rear of the cow is sprinkled with land plaster it will absorb the ammonia. You go into the Boston fertilizer market to-day and buy your nitrogen in the form of ammonia which sells for sixteen dollars to nineteen dollars per ton. You pay that if you buy it by the carload, yet every cow throws off from six to eight dollars worth of ammonia every year, and our farmers pay little attention to it when, if we would use land plaster we would collect it as quickly and thoroughly. This escaping ammonia is one of the most unhealthy things you could have in your stable. It will take the paint off from the carriages, the blacking from the harnesses. It is the worse thing for the derangement of the breathing organs you could have about you, yet stables are shut up tight and cows are given three to five hundred

cubic feet of air and this ammonia arising constantly, irritating the lungs, and weakening the condition of her constitution, giving you less milk and a weakly offspring, when a little land plaster will help it very much.

Now after the ventilation, we add another thing to the cow stable; that is, plenty of light. There should not be a barn in this country that does not contain as much light as this room. I was in Mr. Bowditch's stable in Framingham, Mass. He is a breeder of Guernsey cattle. All along the south side was a continuous row of windows, just like those in this grange hall only set nearer together. That stable was just as light as could be. Now I want to show you the effect of it. You notice cows give yellow butter in summer and white butter in winter. I agree with you that green food has much effect on the color of butter, but sunlight has more than you think. Men and foliage grow white in confinement. You have seen many men that have been confined in dark rooms that look like a cabbage grown in the cellar. If you have plenty of sunlight it will increase the yellow color of your milk and give tone and health to your cows. We have gone through with the question of handling and environment.

In the arrangement of food, hay, in barns, there is in my mind a serious objection in stabling cows with the hay over them. The offensive odors of the barn are thrown into the food. The heat of the stable causes it to penetrate, and the hay like a sponge, catches very much of that which is unwholesome.

The finest barn I ever saw and one I thought the most perfect in arrangement was a cheap barn in the form of an L. The short angle contained at the lower end the hay and silo, and the long angle thirty-six feet wide contained the cattle. They were arranged with their heads to the centre, facing a ten or twelve foot feeding alley. In the centre of this alley running from the short angle clear around between the cows was a railway suspended seven feet overhead and a box running on the railway. A man would take this box, it was a large one, and fill it with ensilage and hay, and trundle it around on the suspended railway between the cows and feed it right and left. I never saw a more thrifty lot of cows in my life. It was a very handy barn, I never saw a man handle sixty cows with greater ease and less expense than I saw there. Now these little simple hints thrown out along these lines, if they are worth anything you are welcome to them. Another point in handling cows is kind and humane treatment. An old German farmer where I live is very

successful, and one of my patrons in the creamery. I liked to study the old man, a quaint, simple-hearted old German. I said to him one day, "You have splendid success with your cows, what do you do?" "Well," he said, "I don't do so many things, I just let them cows have their own way. The cows they do with me more than I do with the cows." I think there was a great deal in that, the cows did with him more than he did with the cows. When the cows came up at night about five o'clock every cow presents herself at the bars. I said, "You have a dog?" "Have a dog?" "Yes." "No, I have no dog; if I get a dog I don't get much milk with a cow." "How do you get these cows up here so regularly?" "Them cows, they like me, they like to come and see me about five o'clock and see how I get along." I said, "Yes, but what else do you do?" "Whenever that cow comes to the stable to be milked she gives me something, and every time that cow gets something from me. You know I always remember that cow, she remembers me about five o'clock." "Oh yes," I said, "you feed the cow every night as she comes to the stall." That was cheaper than a dog. The cow was there always, every night. "Then you keep no dog?" "No." "You have forty cows, your son and yourself, have you a hired man?" "Yes." "Does the hired man use your cows well?" "Use them well?" "Yes, does he ever worry them or strike them?" "Not when they work for me, maybe when they go somewhere else they do." I said you handle these cows very nicely, your cream shows it. He said, "I talk to my neighbor." By the way, the neighbor was a New England man. "I said to him, 'What for you pound this cow?' He call her everything. I say, 'What is the matter.' The man is trying to get the heifer into the stable, into the stall and he strike her and call her everything. I said, 'What for you do that.' He said 'I learn her, I learn her, that cow she is a humbug.' I go away, I say nothing but I think to myself he a bigger humbug than the cow." From this plain, simple-hearted German I learned some good lessons. At this same time I was taking milk from his neighbor who was in the habit of caressing his cows with the milking stool, he drew from us only about thirty-eight dollars per cow a year. This is a simple illustration of a simple physiological law. One man took council of the kindness of his heart and it returned him a large profit. The other took council of his temper, his impatience, he would not learn of his neighbor nor his cow, and so his profits were small.

Now my friends, we sell the comfort of the cow. We want to treat this animal kindly for our own profit if for no other consideration.

I could speak longer upon other branches of this subject but I think if that one lesson is learned thoroughly it may be permeated with the thought of kindly and wise treatment in this matter. If every man would study up that one question of maternity and let it direct him, it would lead him beside still waters, green pastures and contented looing cattle.

I have great faith in the splendid profit of humanity. I have no faith whatever in the profit of inhumanity.

Chesterfield wrote to his son: "My son, it should be to your highest interest to be a gentleman. A real gentleman is not a man of foppish attire, but a man of gentle spirit." And no other man on earth has any business to be a dairyman.

*Ques.* Which do you prefer, a warm, dark stable or one light and cold for a cow?

*Ans.* Of the two I should prefer a warm, dark stable. But I would really prefer a light, warm stable. It is easy to make a stable light and warm by the use of double windows. It is not expensive, either. Simply take a double set of sash and you will have no frost between them. With two sets of windows you will have no frost and you will have a great deal of light and your cows will show it at once.

*Ques.* You made a reference to feeding skimmed milk warm, but did not tell us how high the temperature should be?

*Ans.* Ninety-eight degrees, possibly a little warmer.

*Ques.* You would take that by a thermometer, you would not put your finger in?

*Ans.* No, I am getting more suspicious of my fingers every year. I always notice in this respect that confidence in our own fingers is greater than in our neighbor's. It is very essential the calf should have warm milk, sweet milk, and be fed often. I would like to have you for the next year, and this is to the good wives I see before me, I want you to insist upon trying that with the calves of next spring. I know you can fetch the husband round if you keep at him long enough.

*Ques.* In regard to feeding linseed meal in the milk, doesn't it form a jelly?

*Ans.* Yes, sir. The calf up to the time he is six weeks old has what is called a rennet stomach. By that you know that I mean a baby stomach. By that time he begins to have a ruminating stomach, takes in solids. Those of you who have seen a calf throw up its first cud will remember that he looked as if he was going to throw himself inside out. As long as the baby stomach exists you must treat him as a baby. Every mother knows that she must not feed her baby solids or cooked food. If she does she will do her baby injury.

Now when you take this flaxseed and milk you have taken the fat out of the milk and you are putting back a cheaper fat costing only about one cent a pound in place of fat worth twenty-five cents a pound. This is a vegetable fat. Take ground flaxseed, pour hot water over it and make a mush and take a table spoonful in her milk for the first week or so and watch carefully her excrement and see if the calf is digesting it or not. Close wa chfulness may save you a bad case of scours.

There is one other question. Every mother knows, that a baby must be kept dry and if it is not kept dry the baby begins to languish and grow fretful and by and by sickens, so every good mother is careful to keep her little baby dry, and we should do the same for the baby calf and baby pig. Nothing sickens the young of man or animals more than dampness. You know you shut your calf up in the barn, you have given him a place there, you are feeding him skimmed milk which is forming a great deal of moisture in his bed. I have stepped into hundreds of barns in the last year where the calf was running around in water. I spoke to the men about it; they would say "I can't fuss with a calf," I can't do this, I can't do that. If you will preserve that one thing, a comfortable dryness of the calf, it will aid you very much in his life and profit.

*Ques* I have a barn 40x80. I have been hankering after a barn cellar I have none. What I want to know is whether I had better raise the barn, as I could, or put a sill under it and let it remain where it is. One side of the barn is parted off the whole eighty feet and that is where we have kept our sheep. I want to change the sheep into the basement and keep cows where the sheep were and go into the dairy business. I ask you what your opinion would be, whether I should let the barn remain right where it is or raise it up?

*Ans.* This barn cellar is to store manure? Yes sir, partly and partly for sheep.

*Ans.* I notice here in Maine the practice of keeping manure in barn cellars. But I should just as soon think of keeping my family over such a receptacle as my cows. I don't know any reason why the lungs of my cows do not need just as good air as the lungs of my children. Now you pursue this practice quite generally. There are some advantages in it, the utility of covering the manure. Can't you secure it in any other way, by having an outside storage? The storage would cost you no more so far as the room is concerned. It might cost you a little more to get the manure to it. But in my state, and we are about as anxious as you are for the last dollar, we have got through with this idea, and we no longer store manure, we draw it as fast as it is made and spread it on the field that we intend to plow for corn the next spring, or on meadow land.

We are on the question now not of handling cattle but of handling manure. You want to be governed more particularly by your own environment, that is the whole expense to you In Wisconsin we have come to this practice for the reason, with large dairies we have to hire help by the year, and it is the most profitable time of year to do it. Where we hire labor by the year we have gone more into winter dairying. You ought to be swinging over too. You have to board cows in the winter in order to have their society in the summer, and it only costs ten per cent more to keep a cow in good milk condition than it would to keep her as she must be kept if she is going to be efficient next summer. But she gives milk worth thirty to thirty-five or forty per cent more in the winter than in summer. The price of butter is at least one-third more in winter than in summer.

Well now, we have to handle this manure when it can be done the cheapest, that is one consideration. So in the winter time, with our men to help, this manure is drawn out, the stable thoroughly cleaned and sprinkled with land plaster every day. The manure is spread upon the clover greensward that we intend to plow the next spring for corn. I presume none of you plow your land in the fall for corn. Sometimes we draw the manure out in snow four or five feet deep. We have deep snow like you. In the first place if there comes a rain, melting the snow, if the manure is upon the greensward it is not washed away. In many portions of Wisconsin the land is rolling as it is around Augusta, and it is three hundred feet high in the western portion of the state. We were every much surprised in looking over Maine, we were very much surprised to see how much it resembled Wisconsin.

Well, we plow this greensward in the spring, three or four inches, plow light, then roll and harrow. We roll it to take out the air space between the furrows. We pack it down and harrow it thoroughly. This is the way we handle the land. Manure upon the sward in order to save as much as possible of it. That is one reason why we don't like to stall cattle over manure. Another is that I believe it to be injurious. You and I have to navigate our cow ship just as we do a ship on the ocean, for half the time we are out of sight of land. We have to hold to certain principles and be guided by them. The sanitary health of your cow is just as essential as the sanitary health of your family.

In regard to one question which you asked in this matter, of putting your cows on the sheep side of your barn, where the sheep have been. How long have they been quartered there?

*Ans.* About two years.

It is an established principle that cows don't thrive in sheep quarters and on the western plains the cattle men can't make their cattle eat grass where sheep have been grazed. Sheep are a little offensive to cows in that particular. If you do put your cow stable there I would advise you to thoroughly clean it up, taking up the flooring and cleaning up under it and putting in some fresh earth, if you are going to put cows where sheep have been.

*Ques.* I would like to ask your method of tying up before milking?

*Ans.* My method has caused considerable criticism. I have given it in the *Dairyman* several times. I have a system of tying cows which has come to me after long study. I want to get comfort and cleanliness for my cows.

My cows are just as clean in the spring as they would be if they came in from a June pasture. That system is the best I ever tried. The meaning of the little partition between the cows, is to keep the cows apart all the time. I presume I get from 100 to 500 inquiries every year "What shall I do for my cow? one of the teats is closed up, a quarter become injured?" "I can't understand how it became so." Nine out of ten cases it is her neighbor stepping over on her udder when she is lying down, thus causing an injury and you have lost the use of a quarter. I have published my method of tying up two or three times in the *Dairyman*, and shall publish it again in the course of a few weeks.

*Ques.* Do you ever feed cotton-seed meal to cows?

*Ans.* No sir, I never feed cotton-seed meal. I feed corn meal.

*Ques.* What is the principal grain food?

*Ans.* The principle grain food is corn. That is because we use silos very much. There are in my own town forty-five silos. There are in my creamery patronage all the way from 100 to 200 silos. Corn is put up in every shape, and so corn becomes quite an important part of the ration. Our people are large buyers of bran, and purchase some cotton-seed meal, and considerable amount of gluten meal, and oil meal, both old and new process.

*Ques.* What do you think of gluten meal?

*Ans.* I think it is a very good feed.

*Ques.* Do you use the coarse or fine?

*Ans.* Both. I don't know which is best. One thing about gluten meal: a little feed of cotton-seed meal will make a very hard butter. You have got to churn at 68° or 70° if you feed cotton-seed meal. Gluten meal is inclined to make a softer butter. Both are very nice meals. You will find gluten softens your butter, puts more oleine in it. Butter will stand up better with cotton-seed meal, but it is apt to be deficient in flavor. It will give a smeary look on your package in a few days after it has left you. That is detected often by people in the market. You don't know anything about it, the market knows it and you will be the sufferer. If you did know it you would make a little change in the food.

*Ques.* I understood you that cotton-seed meal did effect the flavor of butter?

*Ans.* Yes. It does not produce a sweet, nutty flavor. I believe you can feed flavor into butter. You all know and every good housewife knows that when cows have been six or seven months in milk there is a certain lack of flavor to the butter. That is almost like cotton-seed butter. If you go into Arkansas where they feed cotton-seed heavily you will understand what it is.

*Ques.* How much cotton-seed do they feed?

*Ans.* As high as six to ten pounds in some instances. I knew a man who had a strong thoroughbred Jersey cow that he had fed a ration of twelve pounds of cotton-seed meal. They can take cotton-seed meal down South, I think, more safely than they can in the North. There is not a call for so much of the heat supporting food. We feed here a good deal more corn meal, a food that will give the cow an increase of temperature.

*Ques.* You would not advise feeding much corn meal to a dairy cow?

*Ans.* I like good corn meal, but I want to balance it, and I want to feed it to a cow of decided dairy temperament.

*Rem.* We have here no silos to speak of, the farmers feed largely blue grass, herds grass and a little clover.

*Ans.* I should want to have a little more clover to start with.

*Rem.* We never raise a great deal of clover in this section.

*Ans.* I have understood so, but I was talking on the subject with Prof. Gowell of Orono, and he said they had succeeded in raising clover and I find scattered here and there in Maine men who grow clover. If you can grow clover I would persist in it almost as much, as for anything this side of Heaven. I think it is the grandest thing for the restoration of the farm, and improves both the cow and the land. To answer your question more particularly, we don't feed much timothy hay to cows as a butter fodder. I would swap any time a ton of timothy hay for a ton of fine corn fodder, I would swap it just as fast as I could get the corn fodder in place of timothy, for the reason that silage is preferred to any other feed in Wisconsin, and it has been proven that a ton of corn fodder, grown for that purpose, as grown for the silo, and well cured and handled, will produce more butter than the best ton of timothy hay ever grown in Wisconsin. You have timothy and blue grass. Blue grass is good for butter, and red top is very good also. This covers your whole feed.

As to a daily ration, I want my cow to have about two pounds of albuminoid food, as a cow in giving you one pound of butter has given you almost a pound of albuminoids, caseine, milk sugar and all those other things, how can she give them if you don't feed her a balanced ration. You must, therefore, give her a feed very strong in albuminoids such as she gives back to you. The butter fat is almost pure carbon. The caseine is almost pure albuminoid. She must have something from which to produce these things. She cannot change. A man said to me, "How shall I feed my cow for butter fat?" I commenced by telling him of what milk was composed. Four per cent butter fat, three and one-half per cent caseine, four and seven-tenths per cent milk sugar. He said, "I don't care about these other things, I want just butter fat." I told him I would tell him how to feed for butter fat alone if he would show me a cow that gave milk composed of butter fat only. You must

feed a cow a good albuminoid ration. A good cow ought to have a ration of about twenty to twenty-five pounds a day; eight pounds of good grain, two pounds of which is protein. I wish I could see in every one of your homes that very useful book entitled "Stewart's Feeding Animals." It would do more to assist the young man who wishes to make a study of this question than anything else. He cannot do better than to sit right down and read this book.

We want an eight or ten pound ration, two pounds of albumen to balance the carbo hydrates. If you strike a balance of about three pounds of corn meal, four pounds of bran and two pounds of cotton-seed or linseed meal, you have got about one to five. One of albumen to five of carbo-hydrates. Then give her this hay or whatever other matter you choose.

We have reduced the cost of producing milk very much by the aid of silos. We are carrying to-day a cow population of about 5,000 in six miles square, where, without the silo, we would be able to carry not more than half as many.

*Ques.* What about gluten?

*Ans.* Gluten is not quite so heavy as cotton-seed. Take this percentage, 36 in cotton-seed, 26 in linseed, 18 pea meal, 14 bran, and cream gluten about 18. If you are going to give that proportion you have got to carry it a little further. There is one thing I wish I could induce you to do, instead of buying cotton-seed meal you would raise more peas. Sow the peas and plow them in four inches deep, be sure and get the peas down deep, then sow on top two bushels of oats, the white Schoenen variety, this is the sort with the strongest straw. Take this pea and cut fodder when it is in the milk and gather it and run it into a silo right opposite to the corn silo.

You can reduce the cost of your grain ration about fifty per cent by using a silage of oats and peas in connection with corn silage.

*Ques.* Is there any other crop used besides corn, oats and peas?

*Ans.* Yes, we use millet.

*Ques.* Could that be used here in Maine?

*Ans.* Oh yes, splendidly, it is a very quick crop. You can raise millet here, you can raise it anywhere on earth that you can get sixty days of summer. One thing in millet you have got to do; cut it early enough if you are going to cut it for silage. If you don't you will be apt to have bad results if you feed it to your cows or horses. Millet should be cut before the seed forms, in order to ensure safety in feeding it.

All over the West and all over New England the farmers are pooling their milk together. Heretofore the division has been on the pound plan, the space plan or the inch plan. Investigation has shown that the pound plan, the space plan and the inch plan are unsatisfactory. That an inch of my cream might not make more than one-third or two-thirds as much butter as an inch of my neighbor's cream, and all sorts of tricks come in. I don't know as farmers indulge in tricks in Maine, but in most other states they are not "Sinners above all that dwell in Jerusalem," but sinners nevertheless. Now when the milk was brought to the creameries the division was by the pound. Now 100 pounds of A's milk might make four pounds of butter, 100 pounds of B's milk five pounds, and 100 pounds of C's milk six pounds. A was skimming his milk, B watering his milk, C had poor cows and D rich milk, but they all got the same price per pound. We went to work at our own creameries to work out this thing. In the course of time different ones took up this problem of butter and finally Dr. Babcock took it up and figured it out and found that sulphuric acid would dissolve all the constituents of milk except the butter, which could be made to come to the surface by centrifugal force, and so we could determine the absolute value of a sample.

If you take 100 pounds or 1,000 pounds of gold to the United States mint and say you want to sell that gold, the assayer will chip off from one corner a little chip about as big as a kernel of wheat, he will assay it and tell you how much that gold is worth, and that is the principle of this test. Now I will just give you a little illustration of how this thing works at our creameries. There are about 600 patrons in these creameries. Every morning last night's and this morning's milk is brought into these creameries and a sample is taken of each patron's milk and put into this bottle. To-morrow morning another sample is taken and the next morning another sample is taken and then it is tested and that man's milk is averaged every morning. Suppose he brings me this morning 500 pounds of milk, it tests 4 per cent, that means 20 pounds of butter fat 5x4=20. That is set on a sheet. The next morning he brings 500 pounds of milk, it tests 3 1-2 per cent, that is 17 1-2 pounds of butter fat, that is set on the sheet. The next morning he brings 500 pounds of milk, it tests 4 per cent which is 20 pounds of butter fat, three times brings him 57 1-2 pounds of butter fat. That is A, and that is B, and that is C. All these men

come and hire me to make this butter and give me four cents a pound for making it. I must make over to each man an equitable division of each man's milk. Now when the butter is sold at thirty cents he gets his check. The butter is sold and the total cash is reckoned up, and the total expense and the total number of pounds of butter. Four cents a pound is subtracted and the balance divided. The total amount of cash is divided by the total amount of butter fat and the quotient is the price of each pound of butter fat. Then each man's amount of butter fat is multiplied by that price and his dividend is given to him and there is an equitable division. Each man takes back his skimmed milk, that portion of it which is lost, the buttermilk, is taken out. So every man that brings milk there takes back to his farm the amount of skimmed milk that is his due. Now $300,000 is paid out to these farmers and that little bottle divides the whole amount to a dollar. Now I read to you this afternoon how one man received from us last year $1.36 per hundred for his milk. This was Gen. Geo. W. Burchard who has a herd of thoroughbred Jerseys. He got $1.36 per hundred. His cows gave 467 pounds of milk and paid him $65 in cash apiece. I find another man who got $1 per hundred, another $.96, another $.93 and $.91. The man who got $.91 may have furnished one-third more milk; but in that way you pay the man for butter fat, and he receives his just deserts and by and by that man begins to see where he is deficient. That little Babcock tester has divided according to the just truth of the question.

*Ques.* How is it he pays cash at the end of the month if the butter is not sold on a cash trade?

*Ans.* The butter is all sold at the same price and for cash. Nothing but cash in the transaction. We have 3,200 private customers in Chicago, Milwaukee, Duluth, and St. Paul, that do all this business and guarantee Elgin prices. If they don't get it that is their lookout, if we get more that is our lookout. Elgin is the highest general butter market in the United States.

*Ques* Our best creameries here want a month and a half.

*Ans.* That is true of a good many creameries in the West.

*Rem.* They want to get all orders in before they can pay.

*Ans.* That is right. In our market we know just what we are doing, our customers are waiting to come to us.

*Ques.* Could the people in this State get an equal division without running the risk of losing?

*Ans.* They could get an equal division if they knew just what that butter was selling for.

*Ques.* Could they tell whether they were getting a cut or not?

*Ans.* No man can tell whether he is getting cut or not. We had three or four hundred dollars nicked out of us this summer, we knew about that.

## PASTURES.

By Hon. W. D. Hoard.

I have been talking with some of your people this evening on the question of ruined pastures. I have given that question some thought. A portion of Wisconsin is made up of old farms that they cleared and laid off as regular as house lots. Pastures that have never produced as profitable crops as the trees on them. To get anything out of these pastures to-day you have to send cattle scurrying over a large area to get what they should get on six or eight acres. The result is the cow works herself to death and works the butter out of her cream and the cream out of her milk. A cow should never take any more exercise than is absolutely necessary for her health, because exercise costs money, costss food, costs milk and costs butter. A cow that has to scurry over a large area to get food will not begin to give as much milk as one which can get it on a small area and lie down and chew her cud and rest. Now the question is, what to do with some of these pastures which are nearly valueless? I would suggest this. You cannot fertilize them with manure because that disgusts the cow. Consequently what is known as grass dressing prepared by fertilizer companies is a good thing. In these pastures you have failed to renew the value taken from them by grazing. You have kept them from seeding. They need reseeding. They need also to be broken under, plowed and harrowed. The ordinary slanting toothed harrow is a good thing to use. In as early spring as you possibly can go over this pasture, then as early as you can possibly get on to it, go over this pasture with a slanting tooth harrow, and give it a good mixture, as much as possible, a mixture of June grass and white clover. It is an excellent combination. If you choose, a little red clover. Then follow with your dressing and if you can, give it a dressing of

DUTTON STOCK FARM, ORONO, ME.

land plaster, which is a good thing. I would suggest in the future handling of that pasture, that you divide it. Cattle tread down at least three or four times as much as they crop. Say, take a pasture of forty acres and divide it into three parts. Put the cows into this third this week, the next third the next week and the last third the next week, and right back again and you will find a large improvement in the croppage, and also in the character of the butter and cream, an improvement in its flavor. I find by experiment that a cow will eat of a two and one-half inch croppage about eighty pounds a day. The ordinary thousand pound cow. I want to give you an idea of the value of ensilage. I took a lawn mower and cut this two and one-half inch croppage, I put a cow into the barn and gave her this lawn mower croppage, just as much as she would eat. She ate eighty pounds, and I kept a corresponding amount. I cut 160½ pounds and dried one-half and gave the cow one-half each day. She kept her milk and butter right up as she did when she was grazing. I kept her in this way for nine days, and went to a large amount of labor to determine some facts. I then kept the cow nine days more on the dried grass. I found the eighty pounds of two and one-half inch croppage would weigh about twelve, fourteen, or fifteen, it would vary a little, whether there had been a rainstorm or not. This would amount to about fourteen pounds. After I put the cow on the dry eighty pounds she began to shrink. At the end of nine days she had shrunk in the amount of her cream so she was giving me in value about seventy-eight per cent as much as she had on the green croppage. Now, gentlemen, what was there went out of that dried grass? Water surely, nothing but water. What kind of water was it? It was evidently not distilled water. Does water have nothing to do with cream? You see the value of succulence. A thousand men will tell you dry corn fodder is just as good as succulent green fodder. Your mother and mine used to take fruit and dry it and serve it up in the fall. We now can it. Which suits us best? Ensilage is nothing but canning corn. You pick up a ripe Mother apple from Mr. Pope's orchard, delicious, succulent and full of flavor, you want to eat it.

You set it one side, cut it up and dry it. You munch at it, or try and soak it up and try to eat it but you say "dried apple." Which do you prefer? Which do you think enters into your system and does you the most good? There are some things along this line of reasoning which are of great interest.

We must do something to preserve these pastures. If we refuse to raise the food the cow consumes we ought to do something to preserve the land. If we refuse to have silos and are going to depend on the pastures we must do something to increase these pastures. I shut four cows up and fed them from the croppage of half an acre. I kept mowing this over and over and over again. Could I have kept those cows on that half acre if I had let them crop it themselves? You see what a large increase of feed comes from a given area if you will only cut it and prepare it yourself and feed it to your cows.

## FRUIT CULTURE.

By WILLIS A. LUCE of South Union, delivered at Institutes in Aroostook, Penobscot and Washington counties.

Whatever pertains to the home, whether it be only to add to its comforts or in any way lighten its burdens, is or ought to be of great interest to the farmer I am sorry to say that there is a great indifference manifested by many heads of families in developing that which is noblest and best in the minds of those God has intrusted to their care and who are responsible in a great measure for the future of their children. There is great force in the old adage, "birds of a feather flock together" and "a man is known by the company he keeps." Parents in the farm homes of Maine, you have much to do with the color, texture and general character of that feather We need to have our eyes opened. Coming in contact every day with that which is beautiful, we need to see it that we may learn to love the beautiful Coming in contact every day with that which is pure, we need to see it that we may grow in purity. Of all the objects for thought that might lead to helps in the homes we will take one which, though considered a luxury, lays claims to us through its healthfulness, utility and beauty very close if not directly upon the line of necessity. I refer to the growing of small fruits, so called, for the family. Among these, strawberries usually take first choice as they are more universally used than any other berry, also first in season. Their cultivation is not difficult, but requires some attention to detail, with clean cultivation.

"Any good corn or potato soil, where the water does not stand in the winter, is suitable for growing small fruits. A well-rotted

sod is preferable, made rich by a liberal coat of dressing plowed under in the fall. As soon as the frost is out in the spring, cultivate (well-rotted manure should be used to cultivate in at this time if any is used) and rake off the surface to make it smooth, and clear off debris. The ground is now ready for the plants, and what variety shall they be? If there is a successful grower in your vicinity, he is the one to help you in the matter, and possibly will sell you the plants. The important points are to get a variety of strawberries adapted to the locality, and if it be pistillate to have some perfect flowering sort with it, to fertilize the blossoms. I use the Crescent Seedling with Wilson, Charles Downing or Sharpless. Why I use this plant is because it is vigorous and hardy, yielding full crops of good sized berries. If you send away for the plants, soon as they arrive cut the bunches, moisten the roots and heel into the soil, if the ground is not ready. Do not heel them in bunches, they are likely to heat and spoil. In setting make the row straight by line or otherwise, and set fifteen inches in the row, rows four feet apart. If the plant be a vigorous grower set twenty inches in the row. In setting, use a six-inch garden trowel or garden spade, but make the hole deep enough to receive the roots full length. Do not leave them in a bunch, but spread out fan shape, pressing the dirt firmly around them. This is important in setting any of our fruits.

Careless setting means failure. Be sure not to set higher or lower than is natural. If set too low they get smothered, if too high they dry up. Comply with nature's laws and methods and you will be right Two hundred and fifty plants will be sufficient to supply the full needs of a family with fair culture. Begin to run the cultivator as soon as the plants are set. A little superphosphate worked into the soil near the plant at first hoeing is of great benefit. Cut off buds that appear, also runners, up to the first of July. This gives the plant strength to do work required later. After this date let the runners grow. They will start in all directions but can easily be changed to go in the direction of the row, either being thrown in by the cultivator or placed when hoeing. In cultivating, run the outside cutter very close to the plant, but not deep. This leaves a space but few inches wide for hand work. As the row forms, shut the cultivator for a narrower space. Do all possible work by horse power. It is better to cultivate the same way in the row each time, as the runners will all point the

same way, and are not so likely to catch and tear off. After the first freeze cover with seedless meadow hay or straw, putting more between the rows than on, having that on the rows so thick you can just see the green leaves through. The object of the protection is not so much to keep them from freezing as to keep them frozen, thus preventing freezing and thawing. I usually uncover from the first to the tenth of May, owing to the season. Raking the straw from the plants to form a mulch between the rows, serving by this method a double purpose. These rul s hold good whether you are setting only for home, or market. The financial side of fruit growing is very flattering, especially in the strawberry. I have raised at the rate of 355 bushels to the acre, worth at my home $1,420 net. If one has a love for the business it is very fascinating.

Mr. Terry of Ohio, says he "never knew a horticulturist who was a mean man," the business won't admit of it. The man who sees only the money or hard side of the problem better go into the dust and confinement of a counting house; sure he never was fit for an agriculturist. We must have a heart for the work and in the work, to be successful. The raspberry and blackberry de ight in a loamy soil made fairly rich. Set raspberries in checkrows of five feet, blackberries in checkrows of eight feet. Set in the soil as deep as they were naturally, but do not allow any growth above ground on the cane set, but be careful of the buds just above the crown of the roots. These are what you want to grow. Then you may look for fruit the second year. Cultivate some crop in your raspberry and blackberry plantation the first year. As soon as the canes get well started mulch heavily, keeping weeds checked back in this way. But little care is required after they get well started, except to clear out old canes and cut back those that start for they will grow more than will do well if let alone, all superfluous canes must be treated as weeds. Currants and gooseberries must have a place in the home fruit garden as no more healthful fruit grows than these. They delight in a cool, moist, rich soil; then we may look for good crops provided the worms are kept off, which can easily be done wi h powdered hellebore, either used in solution of water or dusted upon the leaves dry. I prefer to use all poisons in water as there is less danger in handling.

Brother farmers and farmers' wives who shall read these lines though rudely sketched and giving but glimmers of the importance the subject demands, do not pass them by as being too small to be

noticed unless you are more than filling the thoughts in providing those fruits for your family. There may be some member of your household who is just adapted to this work but needs encouragement and a little help to start.

The number of plants for an average family, of each variety of fruit mentioned would be about as follows with prices: 250 strawberry plants, $1.00; 75 raspberries, $.75; 50 blackberries, $.75; 12 currant, $1 00; 12 gooseberry, $1.00; total, $4.50.

These fruits are easily propagated and when one gets started he can easily increase his stock. The problem of keeping our boys and girls at or near home would be nearly solved if our homes were made more attractive by these simple means.

## DAIRYING AS A BUSINESS.

Delivered at Institutes in Oxford, Franklin, Kennebec and York Counties, by O. MEADER of Albion.

The subject of dairying involves not only the production of milk and its manipulation in the process of its manufacture into butter, but also the management of the farm, the right management of the foods and the handling of the cows. It has been often said, and I believe with a good deal of truth, that the cow is a machine for manufacturing milk; now, if we were to purchase a machine for the manufacture of any other article we should try to get a good one, one that was adapted to the work required, and one of the most approved pattern, to the end that the article to be manufactured should be of the best possible quality, and produced at the least possible expense, but after all this pains in getting the machine much depends upon the operator in producing results, if it is handled skillfully and the best material is used for manufacturing the article required, a perfect article will be produced, and *vice versa*. The analogy must be evident to every one, and the necessity of securing a good cow and then feeding her with the best food for producing milk in the most economical manner will not be doubted. But how to secure good cows is an important question. Of course to begin with they must be bought, and as the most desirable cows for dairy purposes are seldom for sale, a person should buy the desired number of the best he can get, and by carefully selecting a

pure blood male, breed up to the desired standard, by raising his best heifer calves. Then comes the question of disposal of the milk. This question will be considered principally with the idea of manufacturing it into butter. The efforts of the board as a general thing, for the past few years, has been in the direction of encouraging the building of creameries and as a consequence, creameries have multiplied until at present forty or more of these desirable institutions are in successful operation in the State, and for any farmer within reach of one of these, the above question is solved, he has only to provide himself with the necessary apparatus for raising cream, set his milk therein, and a man will come around and skim off the cream, take it to the creamery where it will be manufactured into a fine article of butter which will be sold for the highest market price.

But as yet, there are large areas of our State not provided with these conveniences and dairying if carried on at all, must be conducted in a private way, that is, by individual farmers themselves, and to such as these, are these remarks devoted. I belong to this class myself and perhaps my idea as to the whole matter can be illustrated as well by relating my own experience as in any other way. About twelve years ago I became interested in dairying, by attending a meeting like this, where the subject was under discussion. From that time I improved every opportunity, that offered, of gaining knowledge in relation to the business, and soon became so favorably impressed, that I decided to engage in it, with the idea of making it a specialty on my farm. The superior advantages afforded in supplying the farm with the much needed fertilizing material in the most inexpensive way was the principal incentive to this action. I bought eight of the best cows I could find for sale, costing at that time from $30 to $55 a piece, I also bought a bull which had a registry in the Maine Jersey Cattle Association Herd Book. He was kept seven years, and the best heifer calves were raised. A Ferguson bureau creamery with a capacity sufficient for eight cows was purchased, also a revolving box churn of the same capacity, and a lever butter worker. With these appliances the business of dairying was commenced, taking the whole labor of making the butter and caring for the milk upon myself. And right here let me say that every man who is in the business to any extent should do the same for the extra labor incident upon adding dairying to the ordinary business of the farm, should never

be borne by the housewife; a man can, with a little forethought, and extra calculation, do this work and still do nearly if not quite as much work as he would have done without it; his time, perhaps, will be more fully occupied and he will not find quite so much time to spend at the "store" or blacksmith shop, but, if he is interested in the business, and no one should continue in it unless he is, he will enjoy himself just as well and will find that the dollars will accumulate much faster. But to return, I soon found that I needed more cows, but how to keep them was a problem, I thought when I started in that my farm could carry no more than eight. I began to study the question of feed, and for that purpose attended all the farmers' institutes and county granges within reach, visited the farms of prominent dairymen and in this way learned a great deal relative to feeding stock. I became satisfied that I was feeding nearly double the hay that was necessary. I accordingly changed my manner of feeding as well as the amount, instead of feeding my cows three times a day, and giving them all they would eat up clean, they were fed but twice a day, and limited, after experimenting a short time, in order to determine the proper amount, to fourteen pounds by actual weight per day for mature cows; this, with a carefully selected grain ration, consisting of three pounds of shorts, three pounds of corn meal and one and one-half pounds of cottonseed meal per day, fed in two feeds gave me better returns than I had been getting the old way, and proved so satisfactory that it has been continued with slight variations to the present time. It also enabled me to increase my stock of cows to twelve, exchanging my creamery for one with a capacity for eighteen cows, and my box churn for a Stoddard barrel churn with a capacity equal to the creamery. Thus I was provided for handling the milk of twelve cows and feeding them in winter, and by supplementing the pasture feed with forage crops grown for the purpose, they were carried through the summer satisfactorily, and the pastures, in consequence of close feeding in the early part of the season, have improved so that they are now carrying eighteen cows successfully.

It will be seen that by carefully studying the question of feed, and putting in practice the most advanced ideas in relation to them my stock of cows was increased one-third, with better individual returns than the less number under previous management. A very important result for two reasons. First, it increased the produc-

tiveness of my farm by enlarging the amount of fertilizing material to be applied to it. Second, it increased the profits on the butter by reducing the cost of production, which is a point eliciting the most careful study of any manufacturer, and the manufacturer of butter ignores it at his peril. The cost of production was reduced in two ways. First, by a reduction in cost of food material consumed. Second, the larger amount of butter produced could be handled at a relatively lower price per pound, hence, will be seen the utility of stocking the farm to its utmost capacity with cows. In this way all the products of the farm can be disposed of at home at satisfactory prices, thereby saving the expense of taking them to market, which, in some instances, nearly equals their market value. The butter being in a condensed form, is easily moved to the railroad at a nominal cost.

On my way to the depot with butter one winter, I overtook a neighbor with a ton of hay, I asked him what he got for hay, in reply, he said it was a fine article and he got twelve dollars, two dollars above the market price. Being a good farmer and a man with whom I had previously had some talk upon the subject of dairying, I called his attention to the fact that my load which I was moving along easily with one horse, would bring over one hundred dollars, while his, heavily loading two horses, would bring only twelve dollars. He acknowledged the advantage I had over him, but said there was too much work to this dairy business for him. Now this is the trouble, too many are trying to escape work, and especially brain work. Dairying, to be carried on successfully, requires brain work as well as muscular work, it requires attention to details. Nothing can be done in a careless or slipshod manner. Regularity and neatness must be stamped upon every thing. The cows must be fed and watered at regular intervals and at specified times, so there will be no uneasiness noticed. Milking must be attended to at a specified time and performed with cleanliness and despatch; the milk must be skimmed and the cream churned at just the right time in order to produce a fine article of butter and no other kind pays for producing. This course can be pursued just as easily as the opposite if we only make up our minds to it, and lay our plans accordingly.

I would lay special stress upon regularity in the care of everything pertaining to the dairy, more especially in feeding and caring for the cows, for upon that I believe may hinge the whole matter

of success or failure, if you wish to get along with as little food as possible it must be fed with the utmost regularity, in order to receive the best results from it, the cows will learn to a moment, when to look for it, and at no other time will it do them so much good; just so with the milking, it should be done at just such a time. My milking is commenced promptly at six o'clock night and morning the year round, nothing, unless it is of the most urgent nature, causes a deviation from this rule, even while haying, when the time comes for milking that must be, and is, attended to in some way; and this rigid course is seldom attended with any inconvenience. I know there are many farmers who attach no particular importance to this idea, and will call a man whimsical who does, they think that a few minutes or a half hour make no difference with the cow and they milk at any time when convenient, to such I will say, try regularity a while, then be a half hour late, and note the result. You will find a noticeable falling off after the first milking in the amount of milk, which will take three days under the most favorable circumstances, to overcome. This brings me to the care and manipulation of the milk. A person needs some kind of a creamer. If he is so located as to take the advantage of the associated system and decides to do so, he must have one, unless the whole milk is taken by a company running a separator of which there are a few in the State, but with ordinary individual work it is not an actual necessity, for a great deal of fine butter is made from cream raised in small pans in primitive style.

But although this system is susceptible of producing the best results, when carefully managed, yet under ordinary circumstances it is attended with a great deal of uncertainty and requires a large amount of labor. The latter no one will deny while the former is occasioned largely in consequence of fluctuating temperature. To raise cream successfully in this way requires an even temperature at about 62° Fahrenheit, if this can be maintained, the pans filled not over two-thirds full, the milk skimmed in thirty-six hours from setting, churning skilfully done, not less than twice a week, working, salting and caring for the butter scientifically, you can make a fine article. I frequently see it stated in the papers, quoted from different authorities, claimed to be more or less reliable, that the cream cannot all be raised in this way, that there is a larger percentage of butter fat left in the skimmed milk, than by any other process, but I claim that with the conditions favorable, milk can be

creamed as thoroughly by the old fashioned pan system as by any other, but you must have favorable conditions. If the temperature is too low the cream will require a long time to rise and you will not get it all, if the temperature is too high, the milk will sour before the cream all rises and you will sustain a loss then, with the temperature correct, if your pans have not been properly cared for, cleanly washed and thoroughly scalded, the same result may be looked for, but as I said before I am satisfied that with favorable conditions as to temperature, &c, mentioned above, as little loss is sustained in creaming milk by this as by any other process now in use. The separator, properly handled, it is claimed, leaves the smallest percentage of butter fat in the skimmed milk of any system of creaming, and that leaves at least one-tenth of one per cent, and it is called good work if it don't leave more than two-tenths per cent. I have tested the skimmed milk from my creamer, which by the way raises the cream by the open pan system, being provided with means for controling the temperature with ice in summer and artificial heat in winter, having large shallow pans capable of holding one milking from eighteen cows, in which the milk is allowed to set in a temperature of about 62°, thirty-six hours, when it is skimmed with a large skimmer somewhat resembling a dustpan. This skimmed milk, as I was saying, I have frequently tested with the Babcock test and the percentage of butter fat has generally exceeded one-tenth, but has never reached two-tenths, hence the above conclusion.

Now a few words in relation to churning and working the butter. I churn at least twice a week, if allowed to stand longer than that my cream which ordinarily requires no ripening, will get too acid, (the same is true of all shallow pan cream) thus injuring the quality of the butter. My cream is thick and tough when taken off the milk like that from small pans and is stirred thoroughly every time a skimming is added in order to guard against hard lumps; cream from the deep, cold setting process where it is raised quickly, is thin and sweet and will need to be ripened or soured before churning. I use a Stoddard barrel churn with a capacity of fifty pounds, it is thoroughly scalded and in summer cooled with cold water after which the cream is put in, usually about twelve gallons, which will make about thirty-five pounds of butter, to this amount of cream is added a pailful of water at a temperature calculated to bring that of the cream to sixty-two degrees in winter and sixty in summer.

The water is added to make the cream more liquid, otherwise it would become so thick that it could hardly be churned; cream from cold setting does not require it. My butter comes in about forty minutes. It comes in this kind of a churn in a granular form. When it arrives at a stage where the granules are about the size of large kernels of wheat, the churn is stopped, the buttermilk is drawn off and three pails of water is strained into it, at a temperature varied according to the temperature of the atmosphere; if the weather is hot and the granules have a tendency to adhere to each other, the water is not cold enough to prevent this but seldom below fifty-two degrees; the cover is put on and the churn revolved a few times, which will wash out nearly all the buttermilk; this is drawn off and about half or two-thirds as much put in and the churn rocked back and forth a few times, when that is drawn off. If this water does not appear reasonably clear as it is drawn off, a pail of water is poured on with a dipper and allowed to run through the butter with the churn remaining still; after draining a short time one ounce of salt to a pound of butter is added by sprinkling one-half of it evenly over the butter as it stands in the churn and stirring it in with a wooden knife and then, by tipping the churn, the butter is turned the other side up and the remainder of the salt is put on and stirred as before; it is then allowed to stand for half an hour or more, when it is taken out upon a "Water's butter worker," lightly worked, and packed in tubs holding thirty-two to thirty-five pounds; it is then covered with parchment paper thoroughly wet in cold water and a thin layer of salt is spread over it. This butter, it is said by many who have tried it, will keep a year, the last piece in the tub being just as good as the first.

In the washing of butter care must be exercised in relation to the temperature of the water used, it should never be higher than 62 degrees and seldom lower than 52. If the butter should "come soft" the water might be put in at 45 degrees, but should remain but a very short time, as it will make it hard to work.

Regarding the profits of dairying as a business it can be shown conclusively, that taking it "all in all" there is no other branch of business on the farm that affords such returns for the amount of capital and labor required. We are apt to look too much to the dollars we are getting from our daily, weekly or monthly returns for butter, as a measure of our profits when the foundation of the whole business and our prosperity as well, is the building up and

increasing the fertility of our farms. This business affords the opportunity of doing this to an almost unlimited degree, by its susceptibility of being spread out and enlarged to almost any extent desired and yet be a self-sustaining, and if judiciously conducted, a highly remunerative occupation.

The idea of farmers generally, to-day, is that "farming is poor business," that they cannot afford to hire help, and their business is accordingly cut down so they can do it themselves, consequently their farming operations are conducted in a "one-hoss" way. They fail to make it a paying business, the farm is "run out," and perhaps abandoned, when with a little more energy and push, the selecting of some branch as a specialty, and spreading out, increasing their business and hiring help, a success instead of a failure would have been the result.

To show you something of the way I feed my cows and the profits derived therefrom I have prepared a statement of the actual transaction had with my herd for the year ending January 1, 1893.

January 1, 1892, I had thirteen cows. About the first of June I had four heifers come in. December 1st another one was added in the same way, making eighteen in all, thirteen cows and five heifers with their first calf. From January 1st to June 1st a grain ration consisting of one and one-half pounds of cotton-seed meal, three pounds of corn meal and three pound shorts was fed in two feeds, to each cow per day, with fourteen pounds of hay each After June 1st they were required to get their living in the pasture, (the four heifers being added) until October 1st when they were again fed from the barn the grain ration one and one-half pounds cotton-seed meal, three pounds of corn meal and three pounds of shorts with the same amount of hay as before. December 1st another heifer was added. The result is shown as follows: Total cost of keeping, $637.08; average number of cows for the year, 15; cost per cow, $42.47; 3,668 pounds of butter sold at 26 cents, $938.08; 4,320 gallons skimmed milk at 3 cents, $129.60; 900 gallons buttermilk at 2 cents, $18.00; calves, $17 00; total receipts, $1,102.68; net income from herd, $465.60; net income per cow, $31.04; butter per cow in pounds, $241.

It will be seen that I have made no charge for labor, as I allow the dressing to off set that, and I feel safe to reckon a gain in value of the herd by the maturing of the heifers to fully balance the interest on the money invested.

This is not put in here as being a great performance, still when it is considered that they were, with two exceptions, young cows and not in condition to do their best in winter when the highest prices are obtained for butter, it may be looked upon as a fairly good result, and goes to show that dairy cows under ordinary circumstances will pay the market price for all they eat and give a fair profit besides.

# AN ABSTRACT

OF

# Cattle Commissioners' Report, 1893.

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*To His Excellency, the Governor of Maine:*

We present our annual report for the year closing December 31, 1893, together with an account of our expenditures and other proceedings under provisions of the law of 1887, chapter 177, relating to contagious diseases in this State, and as amended in 1892, chapter 194:

The summaries show that 143 inspections were made during 1893, seventy-eight herds of cattle and sixty-two stables were examined, also three flocks of sheep. Twenty-six head of cattle were condemned and destroyed at an appraisal of $927, and twenty-two horses were found affected with glanders and condemned at an appraisal of $995, and sixteen sheep appraised $32, making a total of $1,954. Among the horses destroyed four were not appraised, as not having been owned in Maine the required time under the amended law of 1892. But six of the whole number destroyed were State of Maine horses, sixteen of the number being Canadian and Western bred horses, the larger portion of them having been purchased in Boston market.

Among the cattle destroyed seven cows came to us out of Massachusetts herds, as opposed to sixteen from the same state condemned the previous year.

The summary of our business during 1893, discloses the fact that the total appraisals of the year, of all animals condemned and destroyed, was $1,954, which together with the

expense account of our board, will exceed the amount appropriated by the last legislature, as per vouchers furnished and audited by the treasurer of our Commission and we again take occasion to say that the present annual appropriation for carrying on the work will have to be increased, if the service is to be faithfully performed, and the high standard of health among our "flocks and herds" which we now enjoy is to be maintained. At the last session of the legislature, in view of the fact that the actual expenditures of 1891 and 1892 had exceeded the bi-annual appropriation, our board asked for an increased amount, not only to enable us promptly to meet our obligations and payments to those whose animals were destroyed, but also to prevent a recurrence of a deficiency which now exists, and we are forced to apply a portion of the appropriation of 1894, to the payment of liabilities incurred during 1893, in many instances, where parties to whom money was due have been kept waiting several months. Instead of increasing the appropriation, the *amount of appraisals was reduced one-half*, by which the limit for which any non-registered animal, whether equine or bovine, could be appraised was fifty dollars, of which the State pays one-half.

It must be apparent that there are many high-bred cattle in this State, even if non-registered, whose value "as determined upon the basis of health before infection" is much more than fifty dollars, while in the case of horses that are always more or less exposed to the dreaded disease of glanders, the compensation of twenty-five dollars, to an owner of a horse worth in his business several hundred dollars, is too small a compensation in depriving him of an animal oftentimes perfectly well able to perform the work and duties of a sound horse, were it not that the Commissioners demand his destruction for the public good; and we have encountered the protest of several owners of such horses, within the past year, that if they had known they were to receive such a meagre sum from the State, "*their cases would never have been reported to our board*," the horses thus remaining a constant menace to the health and safety of every man, woman and child in the community.

We believe this enactment to have been false economy and a mistake, as aside of its not being a fair business proposition towards those who are so unfortunate as to possess diseased animals, we are of opinion that it retards and disables the work of our Commission, and reduces our law too near the level of the law of Massachusetts,

which *provides no indemnity whatever* to owners whose diseased animals are condemned and destroyed by order of their cattle commissioners.

In 1883, by an appropriation of $5,000, Maine *stamped out* a far more contagious disease than tuberculosis, when an English steamer at Portland, landed eighteen head of Hereford cattle affected with "foot and mouth disease," and in 1886 another appropriation of $5,000 *stamped out* the violent outbreak of tuberculosis upon the State College Farm, by not only paying for that herd and disinfecting the premises, but also following up and destroying all the produce of that herd that had been sold and scattered throughout this State.

The last report of the Bureau of Animal Industry, United States Department of Agriculture, "says of the danger of using the milk of tuberculous cows:"

"This disease occupies at the present time a very prominent place in the public mind, and rightly so, for it is identical with tuberculosis in man, of which vital statistics claim that it is responsible for the death of fully one-seventh of the human race. The problem now before us, which has been advanced considerably by investigations over the whole world, is to determine the extent to which the milk of tuberculous cows is infected with the bacilli of this disease and the readiest means of detecting such infection. By examining the milk of presumably tuberculous cows at different stages of the disease we hope to gain some definite ideas as to the conditions under which milk must be regarded as positively dangerous. It is true that many sanitarians now regard the milk of tuberculous cattle in all stages of the disease as dangerous, and such a position is undoubtedly the safest. But until more stringent regulations are enforced concerning the regular inspection of dairy cows we must content ourselves with defining, if possible, the limits of danger. All authorities are, however, agreed that the milk of tuberculous cows, suffering with tuberculosis of the udder or bag is positively dangerous, and from this point of view alone, if from none other, the careful inspection of dairy cows for any diseased condition of the udder becomes imperative. Our own investigations have shown that in cows in an advanced stage of tuberculosis the milk may contain tubercle bacilli, although the udder is free from any tubercular changes which can be detected by the naked eye at the autopsy."

"Another problem depending on the former for its importance concerns the easiest and surest means of detecting tuberculosis in cattle. Koch's tuberculin seems to have largely bridged over the difficulty, and we shall, whenever opportunity presents, make test inoculations with tuberculin and endeavor to confirm by post mortem examination the accuracy of the diagnosis. Preliminary trials have been sufficiently favorable to induce us to agree with former experimenters in regarding tuberculin as the best means at hand for the diagnosis of tuberculosis in cattle."

Prominent among other distinguished authorities, we quote a few extracts from the recently published paper of Dr. Billings on "Tuberculosis in Man and Cattle, and their Mutual Relations."

"Diseases cannot be prevented by laws and sanitary organizations alone, any more than people can be made moral by laws, police courts and policemen's clubs. The intelligent co-operation of the people is an absolute necessity to any successful accomplishment of a public purpose. To this end, however, the first thing necessary is that the people shall understand the nature of the work they are expected to co-operate in, and what they have to do, and how they are to do it. For all concerned the Davy Crockett motto is always appropriate—'Be sure you're right, then go ahead.' The most dangerous factor with which we have to contend is surely our own ignorance. Nowhere is this more apparent than in the relation which the public bears to the diseases which threaten its life and health."

"Nowhere can instruction of the public work more profoundly for the protection of future generations from the miseries of disease than in consumption. Nowhere can the casual importance of ignorance in the genesis of a disease be so directly established. To meet an enemy or suppress or ward off a danger it is absolutely necessary that we become accurately acquainted with the true nature of that which threatens."

"In regard to tubercular consumption, a critical study of the history of the disease and its course in civilized people; the important fact that five-sevenths are practically exempt, in such, and especially that a total immunity exists among wild and uncontaminated people; the comparative history of bovine tuberculosis in the same direction indicates that the essential environment to the production and support of a constitution insusceptible to the action of the tubercle bacilli is one which offers the freest possible exposure to the ele-

ments, an abundance of exercise and a sufficiency of strong food, though the latter is the least important of the three factors. The conditions of untrammeled and wild people offer such an environment, and heredity keeps up the constitution supported by it. The modern tendency to the freest possible life in the open air, cold baths and the large sleeping rooms of those having the means, are all environmental conditions having a favorable tendency against consumption. Poverty and ignorance have the opposite history, and present observation teaches, that when men changed from a nomadic life to village communal existence, and the less intelligent and active become differentiated into a class of 'home workers' in confinement; and with the increase of indoor confinement and the limitations on female movement, and physical vigor become an indication of immodesty, with the continued augmentation of people in cities and terrible increase of confinement and sedentary lives, to which must be added insufficient and unsuitable food, under such conditions and in such an environment there gradually developed general constitutional weaknesses, at first only in the weakest individuals, particularly in the systems of circulation and respiration, which were continually increased in intensity by the perfectly unintelligent and virtually insane custom of marriage regardless of physical fitness to bear healthy children, thus continually increasing the tendency to the weaknesses mentioned. The same has occurred in cattle, particularly the Jerseys, Guernseys and Shorthorns, which have been man's fancy breeds, and which have been bred for certain points regardless of physique in other directions. To obtain great yields of milk or beef production, they have been stabled and coddled, fed and forced, utterly regardless of general physique, until the animals have become so refined that, like the women of the past, exercise is the very last thing they are able to undergo. Such conditions necessarily lead to a stagnation of the circulation, and such always finds in the lungs the most favorable point. The final result is what may be termed weak lung tissues, weak circulation, bronchial irritation, with a tendency to bronchial catarrh, weak heart and a generally weak constitution—in other words, exactly the conditions favorable to the lodgment and future development and ravages of the tubercle bacillus. It needs no emphasis from me to the intelligent layman or woman, for in their own families they can probably find evidence enough that no one thinks of any moral responsibility to offspring in the selection of those whom they are to marry. No

one thinks of barring 'lover or love' for any such cause as physical unfitness. Thus has environment and heredity done its work, aided and abetted by ignorance, until two-sevenths of our own race, among them those among whom we live, those we admire, or have around us, are inevitably damned to either become consumptive or die of that disease; while the more fortunate wild man, uncursed by the white man's religion or his refinements and vices, enjoys absolute exemption."

"It is a fact that no native or wild people, who have in no way ever come in contact with the so-called refinements or vices of civilization have been found, which were not always totally exempt from tuberculosis.

A continuance of the absolute control of the contagious diseases of this State, depends upon increased appropriation and a fair appraisal of all animals destroyed, in the opinion of our board, and with these assured, Maine will continue to "lead the way" in protecting the public health, for which no money could be better appropriated.

THOMAS DAGGETT, *President.*

F. O. BEAL, *Secretary and Treasurer.*

GEORGE H. BAILEY, *State Veterinarian.*

# ANNUAL REPORT

OF THE

# Maine State College

# Agricultural Experiment Station.

# 1893.

# MAINE STATE COLLEGE.

# AGRICULTURAL EXPERIMENT STATION.

## THE STATION COUNCIL.

TRUSTEE RUTILLUS ALDEN.....Winthrop.
PROFESSOR WALTER BALENTINE, M. S.....Orono.
TRUSTEE BENJAMIN F. BRIGGS.....Auburn.
PRESIDENT ABRAM W. HARRIS, Ph.D.....Orono.
PROFESSOR FRANCIS L. HARVEY, Ph.D.....Orono.
DIRECTOR WHITMAN H. JORDAN, M. S., *Secretary*.....Orono.
REPRESENTATIVE D. H. KNOWLTON, M. A.,
State Pomological Society.....Farmington.
REPRESENTATIVE B. WALKER McKEEN,
State Board of Agriculture.....Fryeburg.
TRUSTEE ARTHUR L. MOORE, B. S.....Limerick.
PROFESSOR WELTON M. MUNSON, M. S.....Orono.
PROFESSOR FREMONT L. RUSSELL, V. S.....Orono.
REPRESENTATIVE I. O. WINSLOW, M. A.,
Maine State Grange.....St. Albans.

## THE STATION STAFF.

THE PRESIDENT.
WHITMAN H. JORDAN, M. S.....Director.
*MERRITT C. FERNALD, PH.D.....Meteorologist.
WALTER BALENTINE, M. S.....Agriculturist.
JAMES M. BARTLETT, M. S.....Chemist.
FRANCIS L. HARVEY, PH.D.....Botanist and Entomologist.
LUCIUS H. MERRILL, B. S.....Chemist.
FREMONT L. RUSSELL, V. S.....Veterinarian.
WELTON M. MUNSON, M. S.....Horticulturist.
FRED P. BRIGGS, B. S.....Assistant in Botany and Entomology.
HARRIS P. GOULD.....Assistant in Horticulture.
ANDREW M. SHAW.....Foreman in Experimental Agriculture.
MRS. J. HAMLIN WAITT.....Clerk and Stenographer.

*Resigned September 1, 1893.

# TREASURER'S REPORT.

The Maine Agricultural Experiment Station in account with the United States appropriation:

RECEIPTS.

| | |
|---|---|
| From the Treasurer of the United States as per appropriation for the year ending June 30, 1893 | $15,000 00 |

EXPENDITURES.

| | | |
|---|---|---|
| Botany and Entomology | $ 14 87 | |
| Chemical Laboratory | 281 47 | |
| Expense Account | 160 89 | |
| Field and Feeding | 1,253 61 | |
| Fertilizer Inspection | 134 80 | |
| Horticultural Department | 689 56 | |
| Meteorology | 30 70 | |
| Printing | 1,458 79 | |
| Construction and Repairs | 186 04 | |
| Stationery and Postage | 93 95 | |
| Traveling Expenses | 135 35 | |
| Library | 120 85 | |
| Veterinary Science | 5 40 | |
| Fuel | 140 82 | |
| World's Fair | 501 87 | |
| Trustee Expenses | 16 00 | |
| Water Supply | 200 00 | |
| Salaries | 9,574 97 | |
| | | $14,999 94 |

I hereby certify that the above is a correct statement of the amount expended by the Maine Experiment Station for the year ending June 30, 1893.

G. H. HAMLIN, TREASURER,

*Trustees of Maine State College of Agr. and the Mech. Arts.*

I hereby certify that I have examined the accounts of the Maine Experiment Station for the fiscal year ending June 30, 1893; that I have found the above to be a correct statement of expenditures both as to amount and classification, for all of which, proper vouchers are on file.

HENRY LORD, AUDITOR,

*Trustees of Maine State College of Agr. and the Mech. Arts.*

# TABLE OF CONTENTS.

# DIRECTOR'S REPORT.

*A. W. Harris, Ph. D., President Maine State College.*

SIR:—I submit herewith a report of the work performed in the various departments of the Experiment Station for the year 1893:

It is hoped that the facts and discussions therein presented will prove of value to the agriculture of the State, through a careful consideration of their relations to farm practice.

The past year has been one of general prosperity in the affairs of the Station. In one direction, at least, as will be seen by subsequent statements, an addition of equipment and enlargement of work have been made which give promise of results of great value. Better than anything else which could be mentioned, perhaps, is the increasing evidence that the Station is exerting a positively helpful influence in the agricultural affairs of Maine. The large correspondence which has grown up between the Station officers and the farmer citizens of the State, the numerous appeals for aid in various directions and the cordial and sympathetic reception which representatives of the Station receive at farmers' institutes and other public meetings may not only constitute substantial reasons for encouragement, but may also convey to each member of the Station staff a sense of personal gratification. I wish to express in behalf of myself and my associates a grateful appreciation of the pleasant relations which we have come to sustain toward a large number of leading Maine farmers, and of the cordial co-operation of the Board of Agriculture, the State Pomological Society and the Patrons of Husbandry.

## FERTILIZER INSPECTION.

The Maine legislature of 1893 enacted a new law for the control of the sale and inspection of commercial fertilizers, of which the Director of this Station is made the executive officer. This work will necessarily and properly be done at the Station.

It is provided that an analysis fee of fifteen dollars shall be paid by the manufacturers, importers or dealers for each distinct brand of fertilizer of which more than thirty tons are sold in Maine, the income thus derived to be used to pay the expenses of the fertilizer inspection and publishing the results. It is even now very evident that this fee is too small. In fact, the experience of ten or twelve years had previously shown that a fee of at least $20 would be needed. It is hoped that the legislature of 1895 will remedy this error by increasing the fee.

### THE NEW FORCING HOUSE.

The most notable addition to the Station equipment is the new forcing house, now nearing completion, which is to be used in the study of problems in plant nutrition. The work is to be under the immediate charge of Professor Balentine, who reports on subsequent pages the results of experiments made in the forcing house erected several years since. It is believed that in giving more attention to a scientific study of certain phases of plant nutrition the Station will occupy a field very largely neglected by American experiment stations, this line of study having so far held a place much subordinate to animal nutrition. The new house is 65x18 feet, and is to be equipped in a manner best adapted to its intended purpose.

### INCREASE OF MAILING LIST.

At a meeting of the Station Council in the autumn of 1892, it was urged that the list of farmers receiving the publications of the Station should be increased. This matter was left with me for action. After considering several plans, I decided to send to each postmaster in the State a card-board poster showing a cut of the College buildings, and stating thereon that the station publications would be sent free to any Maine farmer requesting them. Through such advertising and by other means that have been adopted, the mailing list of residents of this State has been increased over two thousand names, so that now it numbers between seven and eight thousand. It is doubtful if a larger proportion of the farmers of any state are receiving the bulletins of their experiment station than is the case in Maine. During the year the mailing list has also been revised by sending to each postmaster for correction a list of names previously addressed to his office. In this way a large number of errors were corrected.

## STATION PUBLICATIONS.

The large increase that has been made to the mailing list has rendered it necessary to consider the most economical methods of preparing and distributing Station publications. It is very desirable, also, that the manner of presenting the results of experiments and investigations shall be such as to secure for them wide attention. Experience has shown that in order to accomplish this, the statements made by Station officers must be as concise and simple as is consistent with accuracy. On the other hand, it is very important that a certain class of readers, such as other station workers and the farmers who possess scientific knowledge and training, shall have access to a full record of the data upon which are based the conclusions that stand in close relation to farm practice. In view of the foregoing considerations, it has been decided to issue numerous short bulletins, of not over four pages each, which shall be sent to the entire mailing list, and which shall present to the reader, in a form adapted to the unscientific public, all the results of Station work which have an immediate relation to farm practice. There will also be issued an annual report which shall contain a complete record of the doings of the Station, stated in part at least, in a somewhat scientific and technical form. It is proposed that this annual report shall have a circulation limited to the officers and staffs of other stations, certain exchange publications and such farmers as shall specially request that it be sent to them.

## ACKNOWLEDGMENTS.

I append a statement of gifts made to the Station, and publications received by the Station free of charge. I wish to make our acknowledgment for these favors.

W. H. JORDAN, *Director.*

MAINE STATE COLLEGE,
ORONO, ME., Dec. 31, 1893.

# Donations to the Horticultural Department, 1893.

J. M. Thorburn & Co., New York, N. Y., vegetable seeds.

W. Attle Burpee, Philadelphia, Pa., miscellaneous vegetable and flower seeds.

J. J. H. Gregory & Son, Marblehead, Mass., vegetable seeds.

U. S. Department of Agriculture, Washington, D. C., vegetable seeds, cions, cuttings.

Cornell University, Ithaca, N. Y., cuttings of Russian willows and poplars.

A. M. Smith, St. Catherines, Ontario, six plants Pearl gooseberry.

H. S. Anderson, Union Springs, N. Y., three plants Frontenac gooseberry.

Benjamin F. Sill, Long Island City, N. Y., one rubber plant sprinkler.

Gould's Manufacturing Co., Seneca Falls, N. Y., one Knapsack spraying pump.

The following newspapers and other publications are kindly donated to the Station by the publishers during 1893-4:

Farmers' Home, Dayton, Ohio.
Holstein Friesian Register, Boston, Mass.
Farm and Home, Springfield, Mass.
Jersey Bulletin, Indianapolis, Ind.
Monthly Bulletin, Philadelphia, Pa.
Farmers' Advocate, London, Ont.
Maine Farmer, Augusta, Maine.
Southern Cultivator, Atlanta, Ga.
American Dairyman, New York, N. Y.
The Sun, Baltimore, Md.
Massachusetts Ploughman, Boston, Mass.
Practical Farmer, Philadelphia, Pa.

New England Farmer, Boston, Mass.
Louisiana Planter, New Orleans, La.
Mirror and Farmer, Manchester, N. H.
Texas Farmer, Dallas, Texas.
Hoard's Dairyman, Fort Atkinson, Wis.
Iowa Farmer and Breeder, Cedar Rapids, Iowa.
Detroit Free Press, Detroit, Mich.
Orange County Farmer, Port Jervis, N. Y.
Farm Journal, Philadelphia, Pa.
Delaware Farm and Home, Wilmington, Del.
The Western Rural, Chicago, Ill.
American Cultivator, Boston, Mass.
Farmers' Review, Chicago, Ill.
The Rural Canadian, Toronto, Ont.
Vick's Magazine, Rochester, N. Y.
The Farm and Dairy, Ames, Iowa.
The Clover Leaf, South Bend, Ind.
New York World. (Weekly.)
The Grange Visitor, Lansing, Mich.
The Industrial American, Lexington, Ky.
The American Grange Bulletin and Scientific Farmer, Cincinnati, Ohio.
Agricultural Epitomist, Indianapolis, Ind.
The Prairie Farmer, Chicago, Ill.
Northern Leader, Fort Fairfield, Me.
Farm Life, Rochester, N. Y.
American Agriculturist, New York.
American Creamery, Chicago, Ill.

# Investigation on the Foraging Powers of Some Agricultural Plants for Phosphoric Acid.

WALTER BALENTINE.

Of recent investigations in plant nutrition those establishing the fact that leguminous plants are able to gather a portion of their nitrogen either directly or indirectly from the free nitrogen of the air are by far the most important, both from the scientific and the practical stand points.

These investigations settle a question that has attracted the attention of agricultural chemists for half a century. On the practical side the results enable us to say, that it is possible, by growing and feeding to farm animals such plants as peas and clover, to increase the stock of nitrogen for manurial purposes without resorting to the various expensive commercial nitrogenous materials.

Stating the results of these investigations concisely, it has been found that the leguminous plants are able to forage on the atmosphere for a portion of their nitrogen. Other plants either possess this power to a much less degree or not at all. If we look for a reason why this family of plants has attracted so much attention from scientists we find it in the fact that some of its members, the clovers especially, have been found in practical farming to be plants which by their growth on the soil, apparently leave it richer in plant food than before, and that farmers are actually able to produce more of grass, grain and potatoes when clover is used as one of the crops in rotation. It was to learn why a plant that takes up such large quantities of nitrogen as clover, should still leave the ground in a better condition for succeeding crops, that the sources of supply of nitrogen to the leguminous plants have been so carefully studied.

The value of the results of this work to the agriculture of the world cannot be over-estimated. There are, however, other problems in plant nutrition which deserve as careful study as the

nitrogen question and which may yield results of equal practical importance.

All who have given especial attention to the subject of plant nutrition will, undoubtedly, agree that the foraging powers of plants for the elements contained in the ash, vary greatly. This fact is recognized by the majority of observing farmers, as is shown by the following common sayings: Wheat requires a rich soil." "Corn is a grass feeder." "Oats are an exhaustive crop "

Notwithstanding that these views regarding the variation in foraging powers of different crops have been held by many for years, no one is prepared to say just how it is exerted. We are hardly ready to express an opinion whether the greater vigor of certain plants as compared to other species grown on the same soil is due to their superior foraging powers for all of the elements contained in their ash, or for one or more particular elements.

It seems quite as likely, however, that some plants are able to use certain soil compounds of potash or phosphoric acid, which are not available to other plants, as it did that the legumes were able to obtain nitrogen from sources that were not available to the grasses.

Believing that a study of the foraging powers of different agricultural plants would reveal facts of scientific interest, and at the same time of practical value to agriculture, the writer commenced a series of experiments, in the fall of 1892, designed to test the readiness with which different plants obtain their phosphoric acid from insoluble phosphates.

The reason why phosphoric acid was selected on which to make these first studies, in preference to any other substance was, that in practical manuring with crude phosphates, and also in their use in experimental work, different crops had apparently showed decided differences in their abilities to gather phosphoric acid from such a source.

## EXPERIMENTAL METHODS.

In order to have the work as much as possible under control the experiments were conducted in boxes in the college forcing house. These boxes were of wood, fifteen inches square and twelve inches deep. For soil a fine sand was used, taken from a sand bank about three feet below the surface. This sand was drawn to the forcing house, screened and thoroughly mixed by repeatedly shoveling it over, after which a sample was taken and the content of potash

and phosphoric acid determined, with the following result: Potash, 0.096 per cent; phosphoric acid, 0.012 per cent.

One hundred and twenty pounds of sand were used in each box.

For each kind of plant studied nine boxes were used, in three sets of three boxes each.

The three boxes of each set received the following manuring per box:

SET I { 8.5 grams nitrate of soda = 1.36 grams nitrogen.
2.6 grams muriate of potash = 1.36 grams potash.

SET II { 8.5 grams nitrate of soda = 1.36 grams nitrogen.
2.6 grams muriate of potash = 1.36 grams potash.
17.0 grams South Carolina rock = { 3.96 grams insoluble phosphoric acid.
0.39 grams citrate soluble phosphoric acid.

SET III { 8.5 grams nitrate of soda = 1.36 grams nitrogen.
2.6 grams muriate of potash = 1.36 grams potash.
28.5 grams acidulated South Carolina rock = { 3.34 grams soluble phosphoric acid.
0.50 grams citrate soluble phosphoric acid.
0.62 grams insoluble phosphoric acid.

It will be seen that all of the boxes were treated alike with reference to potash and nitrogen, that the plants grown in Set I were dependent on the phosphoric acid originally in the sand, that those grown in Set II had in addition 4.32 grams of phosphoric acid, mostly insoluble, supplied by crude finely ground South Carolina rock, and that those grown in the boxes of Set III had in addition to that originally contained in the sand 4.46 grams of phosphoric acid, mostly soluble, supplied in acidulated South Carolina rock.

The plants thus far studied have been wheat, barley, corn, beans, peas, potatoes and turnips.

| | | |
|---|---|---|
| Wheat was planted in the boxes of | | Set I A, Set II A and III A. |
| Barley | " | " Set I B, Set II B and III B. |
| Corn | " | " Set I C, Set II C and III C. |
| Beans | " | " Set I D, Set II D and III D. |
| Peas | " | " Set I E, Set II E and III E. |
| Potatoes | " | " Set I F, Set II F and III F. |
| Turnips | " | " Set I G, Set II G and III G. |

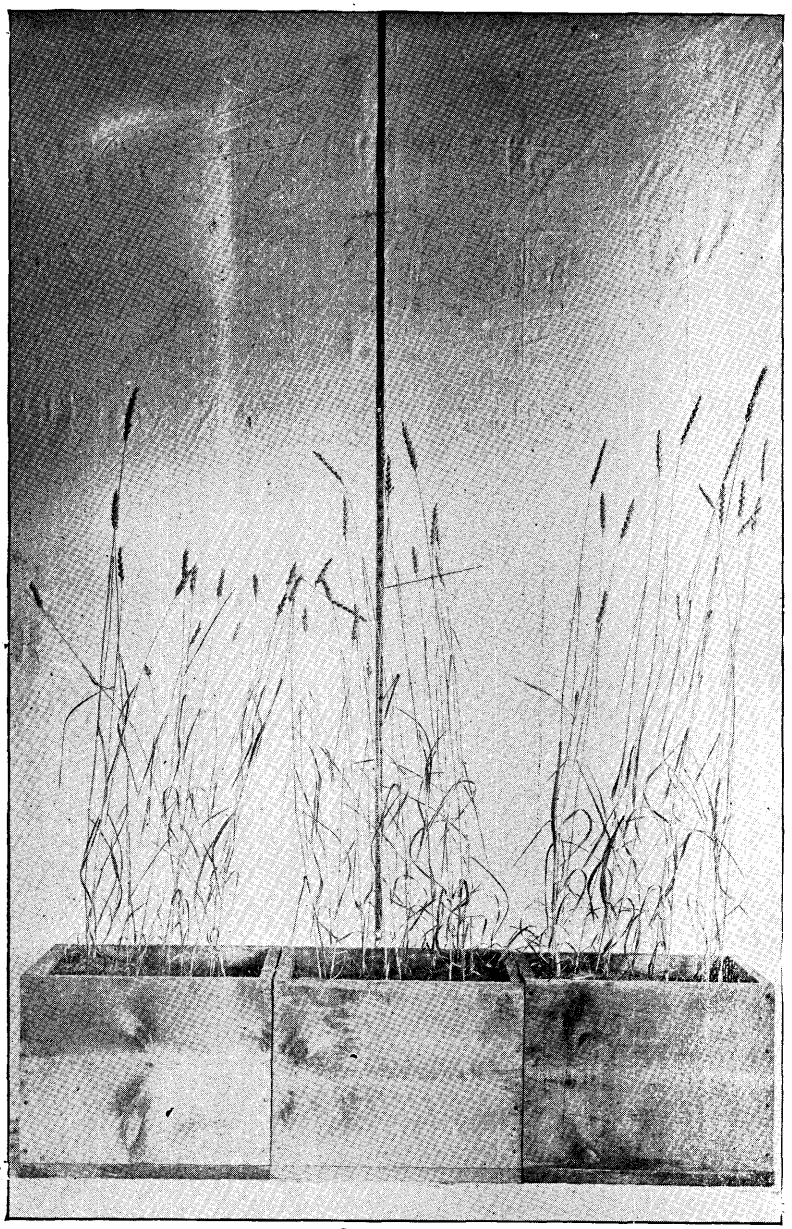
After planting, the boxes were under the care of a man experienced in growing plants under glass. Water was supplied as it was believed to be needed. At the proper time the plants were thinned so that the boxes having the same kind of plants contained the same number of plants to the box.

The plants were allowed to grow to maturity. Immediately before harvesting, the crops were photographed and plates made

showing the relative development of the plants produced. At the time of harvesting, the crops of wheat, barley, corn, peas and beans produced in each box were weighed separately in an air dry condition, after which the amount of dry matter was determined in the combined crop of the three boxes of each set. In the combined crop of each set the nitrogen was determined as well as the phosphoric acid, potash and other mineral matters.

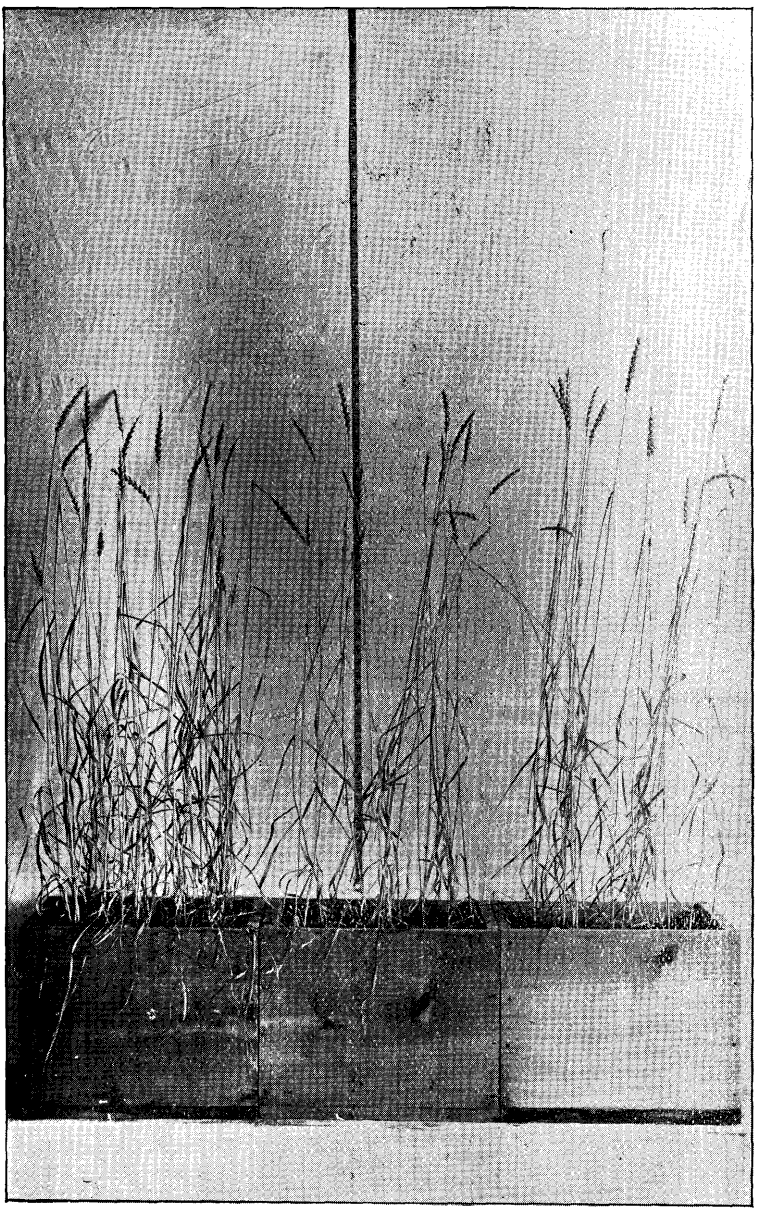
With the pototoes and turnips the crops were weighed fresh at harvesting. In other respects these crops were treated like the others.

The results of this investigation are shown in the following tables with the accompanying plates :



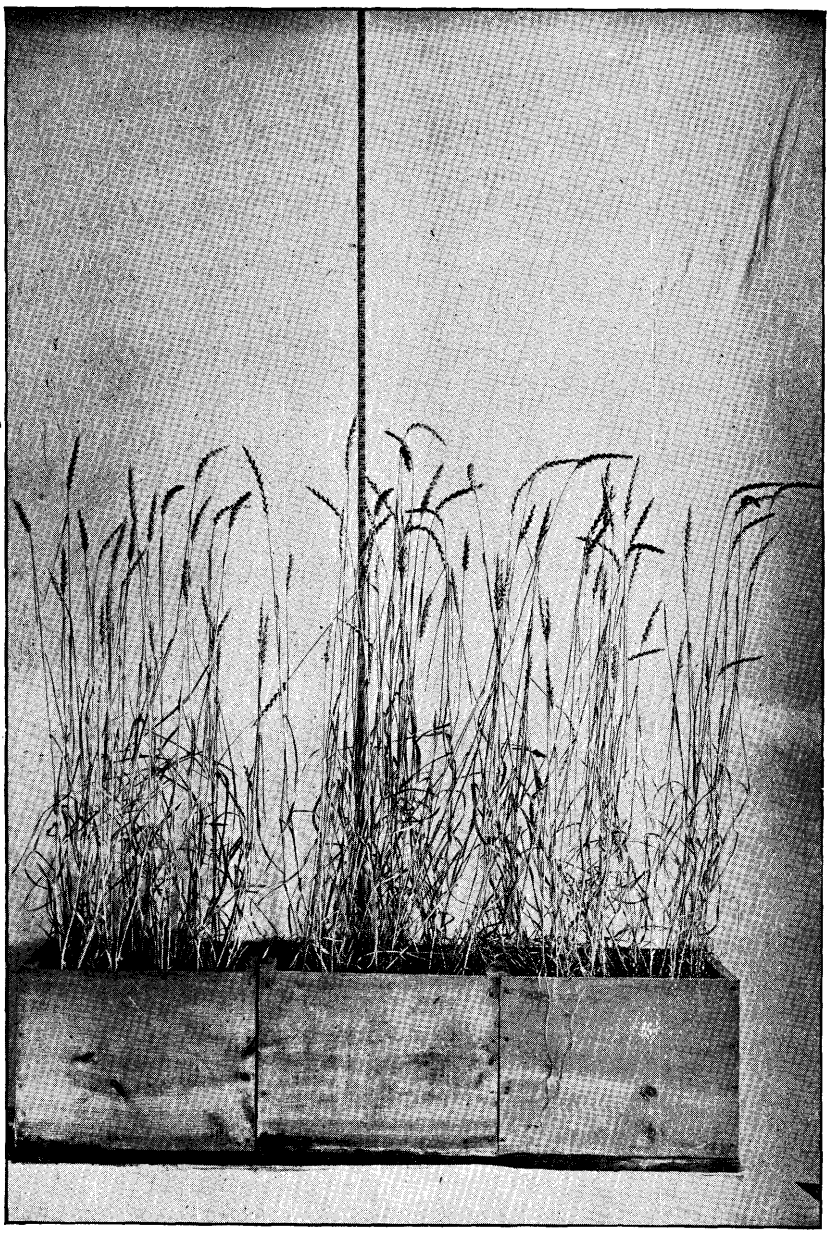
**CROP, WHEAT.**

*Manure*,—Nitrate of Soda, Muriate of Potash.



**CROP, WHEAT.**

*Manure*,—Nitrate of Soda, Muriate of Potash, S. C. Rock Phosphate



**CROP, WHEAT.**

*Manure,*—Nitrate of Soda, Muriate of Potash, Acidulated S. C. Rock Phosphate.

TABLE I.

EXPERIMENT WITH WHEAT.

| Set. | Manure per box. | No. of box. | Total crop. | Grain. |
|---|---|---|---|---|
| I A.. | Nitrate of soda, 8.5 grams, and muriate of potash, 2.6 grams. | 1 | 22 grams | 7 grams |
| | | 2 | 26 grams | 8 grams |
| | | 3 | 36 grams | 11 grams |
| | | Total.. | 84 grams | 26 grams |
| II A.. | Nitrate of soda, 8.5 grams, muriate of potash, 2.6 grams, and crude South Carolina rock, 17 grams. | 1 | 46 grams | 15 grams |
| | | 2 | 79 grams | 24 grams |
| | | 3 | 37 grams | 11 grams |
| | | Total.. | 162 grams | 50 grams |
| III A.. | Nitrate of soda, 8.5 grams, muriate of potash, 2.6 grams, and acidulated South Carolina rock, 28.5 grams. | 1 | 103 grams | 32 grams |
| | | 2 | 92 grams | 30 grams |
| | | 3 | 130 grams | 43 grams |
| | | Total.. | 325 grams | 105 grams |

Dry matter.

Set I A ..... 76.9 grams
Set II A ..... 148.6 grams
Set III A ..... 296.3 grams

TABLE II.

EXPERIMENT WITH BARLEY.

| Set. | Manure per box. | No. of box. | Total crop. | Grain. |
|---|---|---|---|---|
| I B.... | Nitrate of soda, 8.5 grams, and muriate of potash, 2.6 grams. | 1 | 78 grams | 19 grams |
| | | 2 | 54 grams | 9 grams |
| | | 3 | 83 grams | 16 grams |
| | | Total.. | 215 grams | 44 grams |
| II B... | Nitrate of soda, 8.5 grams, muriate of potash, 2.6 grams, and crude South Carolina rock, 17.0 grams. | 1 | 88 grams | 22 grams |
| | | 2 | 118 grams | 18 grams |
| | | 3 | 106 grams | 21 grams |
| | | Total.. | 312 grams | 61 grams |
| III B.. | Nitrate of soda, 8.5 grams, muriate of potash, 2.6 grams, and acidulated South Carolina rock, 28.5 grams. | 1 | 174 grams | 4 grams |
| | | 2 | 175 grams | 3 grams |
| | | 3 | 189 grams | 10 grams |
| | | Total.. | 538 grams | 17 grams |

Dry matter.

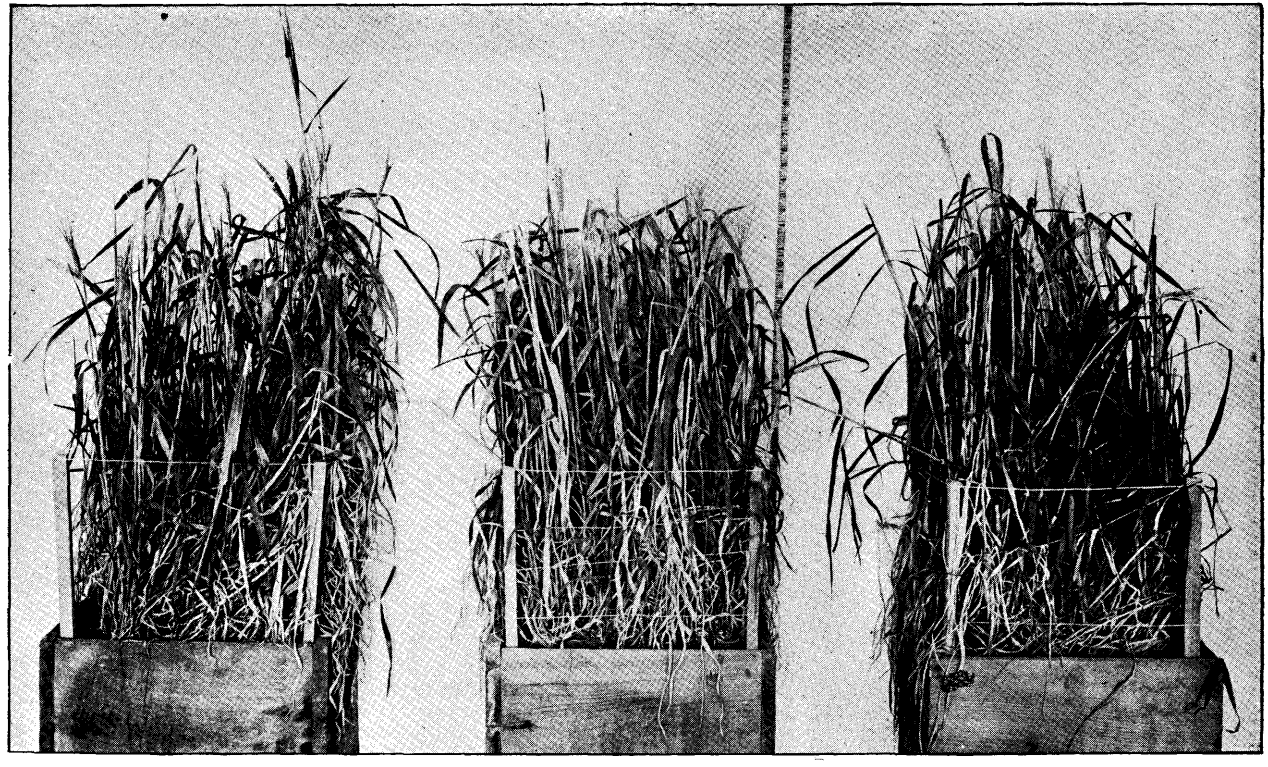
Set I B ..... 201.5 grams
Set II B ..... 294.9 grams
Set III B ..... 508.1 grams

**CROP, BARLEY.**

*Manure*,—Nitrate of Soda, Muriate of Potash.

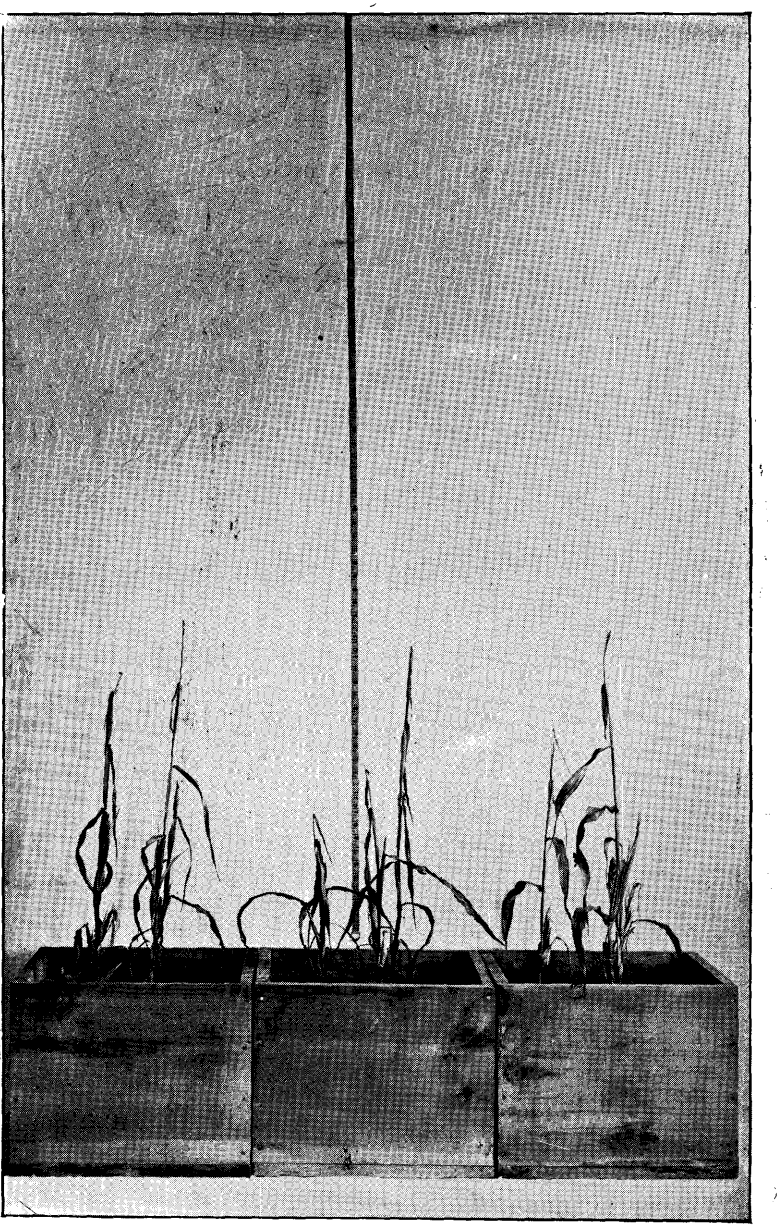
**CROP, BARLEY.**

*Manure*,—Nitrate of Soda, Muriate of Potash, S. C. Rock Phosphate.



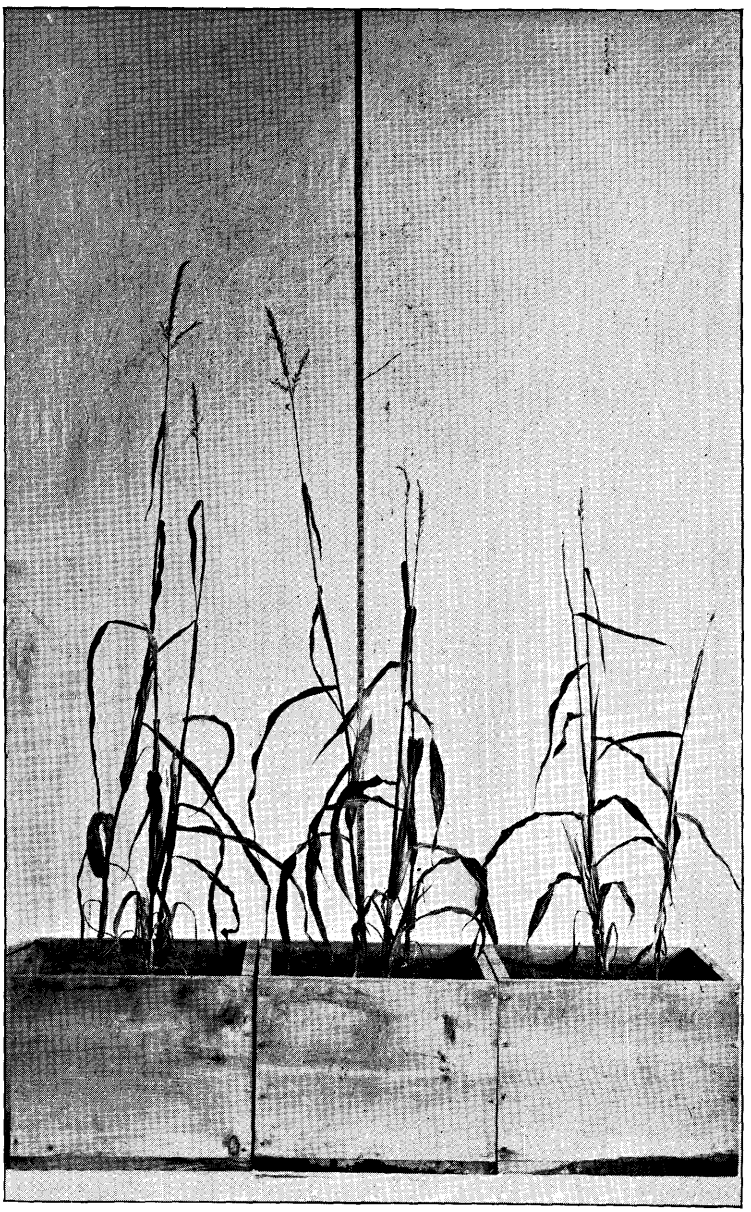
**CROP, BARLEY.**

*Manure*,—Nitrate of Soda, Muriate of Potash, Acidulated S. C. Rock Phosphate.



**CROP CORN.**

*Manure*,—Nitrate of Soda, Muriate of Potash.



**CROP, CORN.**

*Manure*,—Nitrate of Soda, Muriate of Potash, S. C. Rock Phosphate.

**CROP, CORN.**

*Manure*,—Nitrate of Soda, Muriate of Potash, Acidulated S. C. Rock Phosphate.

TABLE III.

EXPERIMENT WITH CORN.

| Set. | Manure per box. | No. of box. | Total crop. |
|---|---|---|---|
| I C.. | Nitrate of soda, 8.5 grams, and muriate of potash, 2.6 grams. | 1 | 15.0 grams |
| | | 2 | 15.0 grams |
| | | 3 | 15.0 grams |
| | | Total.. | 45.0 grams |
| II C.. | Nitrate of soda, 8.5 grams, muriate of potash, 2.6 grams, and South Carolina rock, 17.0 grams. | 1 | 46.0 grams |
| | | 2 | 53.0 grams |
| | | 3 | 29.0 grams |
| | | Total.. | 128.0 grams |
| III C.. | Nitrate of soda, 8.5 grams, muriate of potash, 2.6 grams, and acidulated South Carolina rock, 28.5 grams. | 1 | 164.0 grams |
| | | 2 | 129.0 grams |
| | | 3 | 129.0 grams |
| | | Total.. | 422.0 grams |

Dry matter.

Set I C..... 39.5 grams
Set II C..... 103.3 grams
Set III C..... 291.0 grams

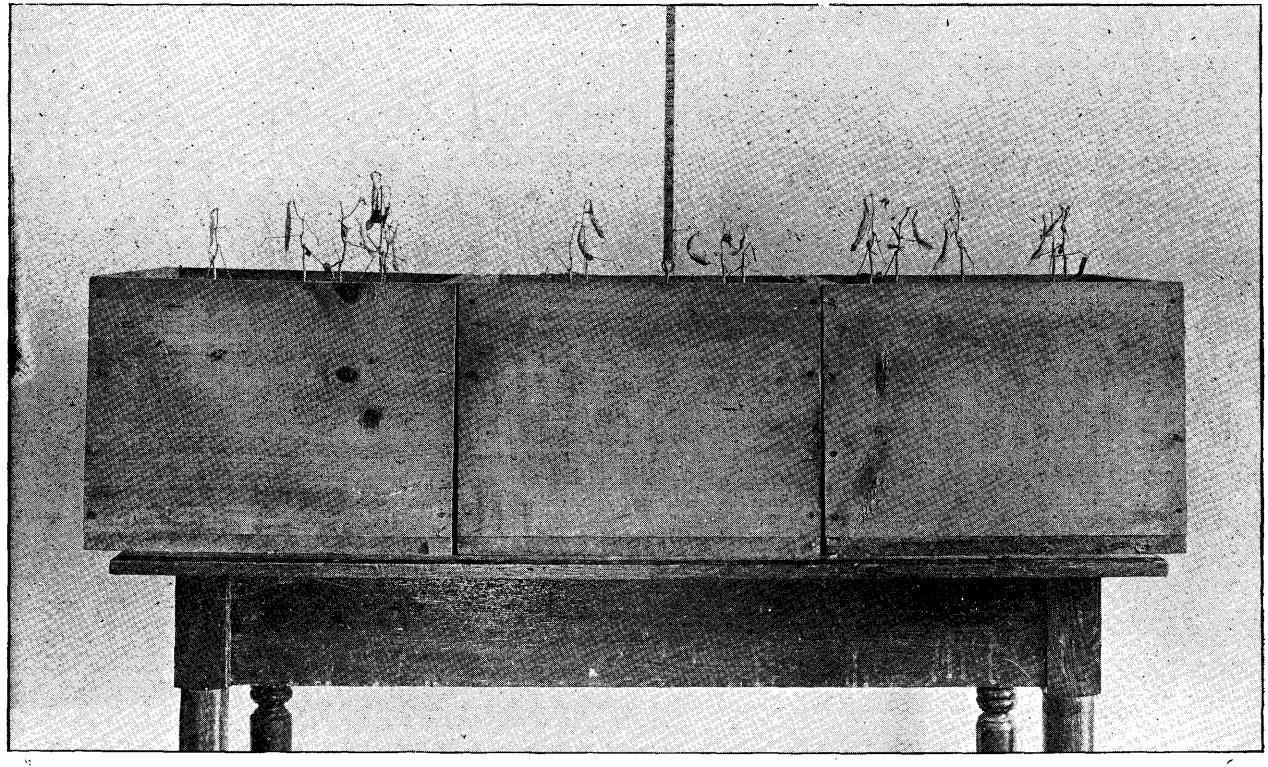
TABLE IV.

EXPERIMENT WITH BEANS.

| Set. | Manure per box. | No. of box. | Total crop. | Beans. |
|---|---|---|---|---|
| I D ... | Nitrate of soda, 8.5 grams, and muriate of potash, 2.6 grams. | 1 | 6 grams | 1 gram |
| | | 2 | 6 grams | 1 gram |
| | | 3 | 5 grams | 1 gram |
| | | Total.. | 17 grams | 3 grams |
| II D.... | Nitrate of soda, 8.5 grams, muriate of potash, 2.6 grams, and South Carolina rock, 17.0 grams. | 1 | 6 grams | 1 gram |
| | | 2 | 7 grams | 1.5 gram |
| | | 3 | 6 grams | 1.5 gram |
| | | Total.. | 19 grams | 4.0 grams |
| III D .. | Nitrate of soda, 8.5 grams, muriate of potash, 2.6 grams, and acidulated South Carolina rock, 28.5 grams. | 1 | 25 grams | 10 grams |
| | | 2 | 29 grams | 12 grams |
| | | 3 | 21 grams | 9 grams |
| | | Total.. | 75 grams | 31 grams |

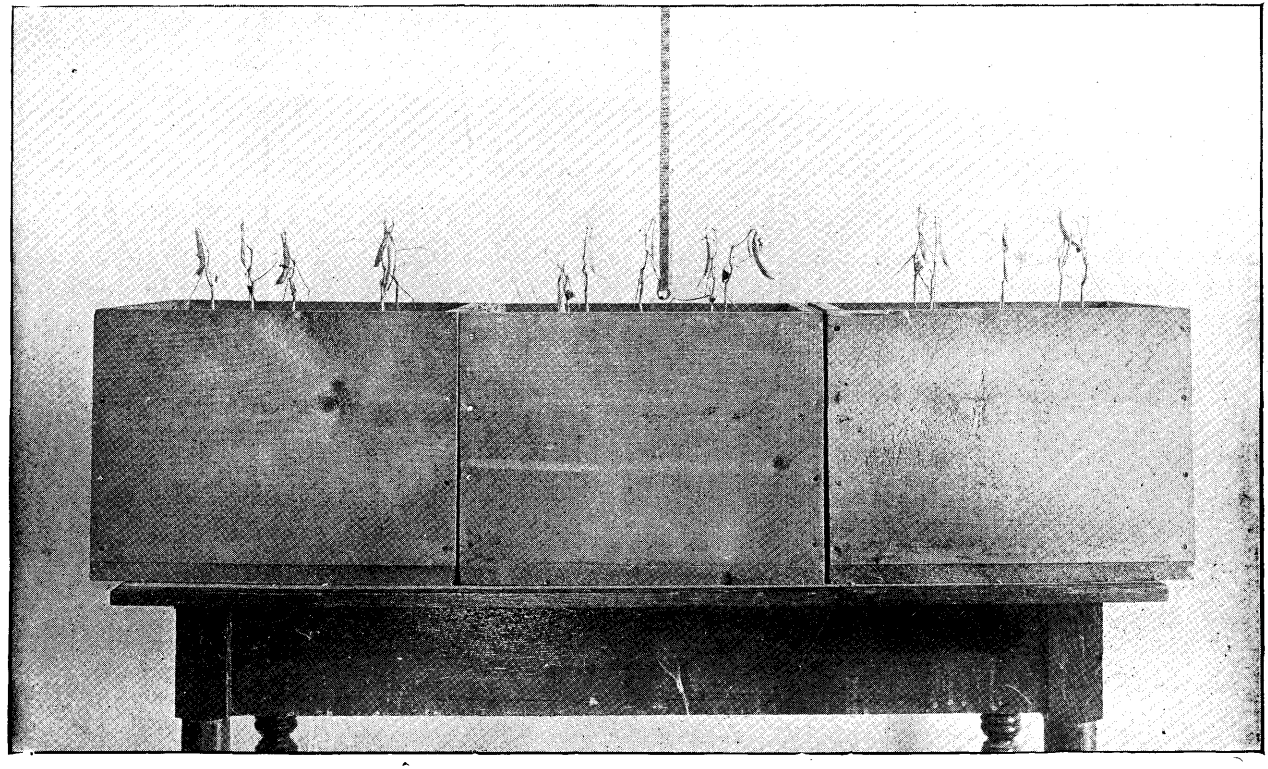
Dry matter.

Set I D..... ..... 15.7 grams
Set II D..... ..... 17.4 grams
Set III D..... 69.8 grams



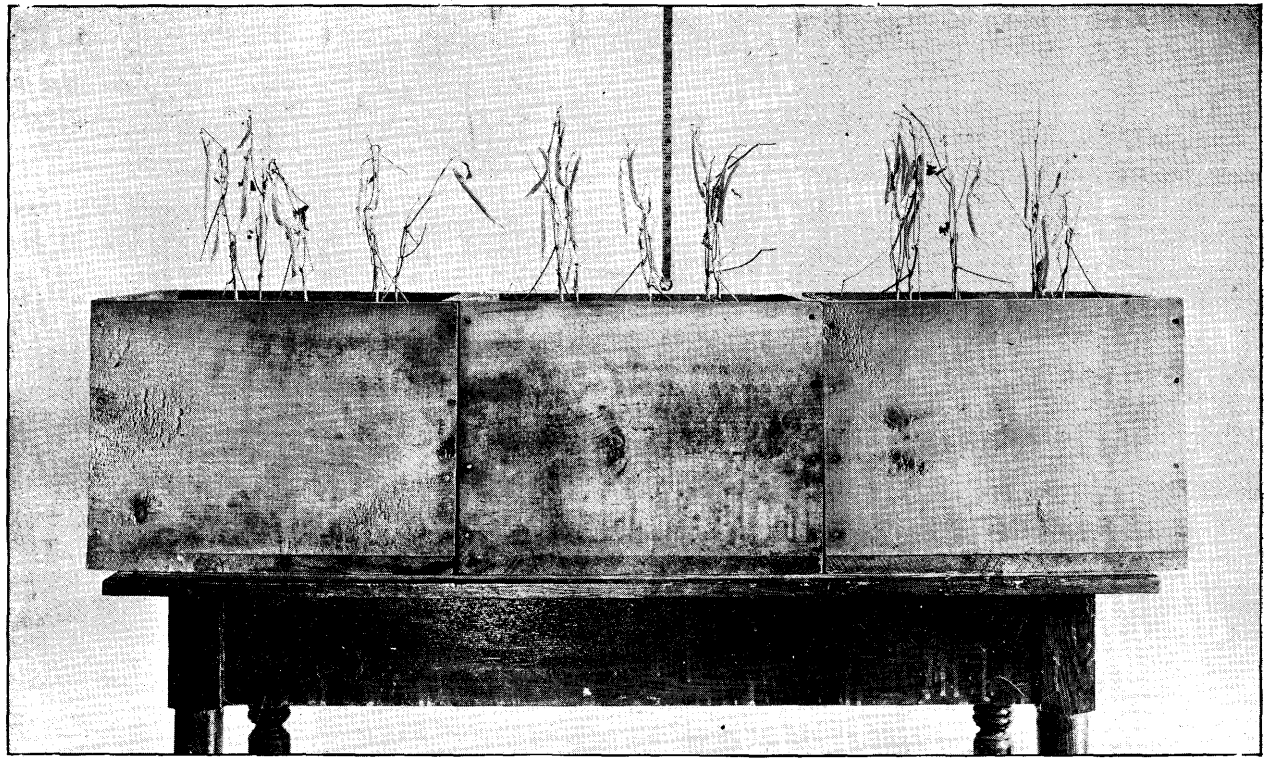
**CROP, BEANS.**

*Manure*,—Nitrate of Soda, Muriate of Potash.



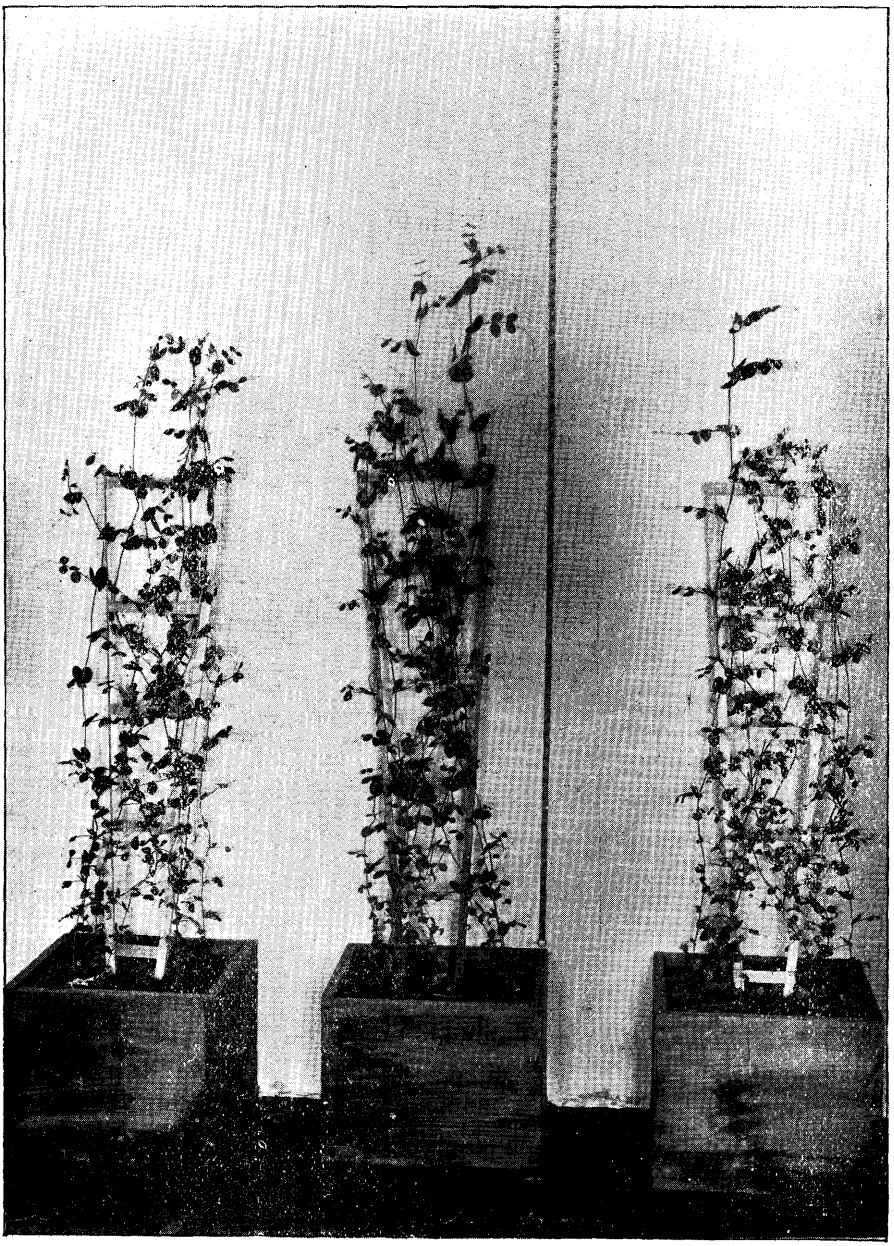
**CROP, BEANS.**

*Manure*,—Nitrate of Soda, Muriate of Potash, S. C. Rock Phosphate.



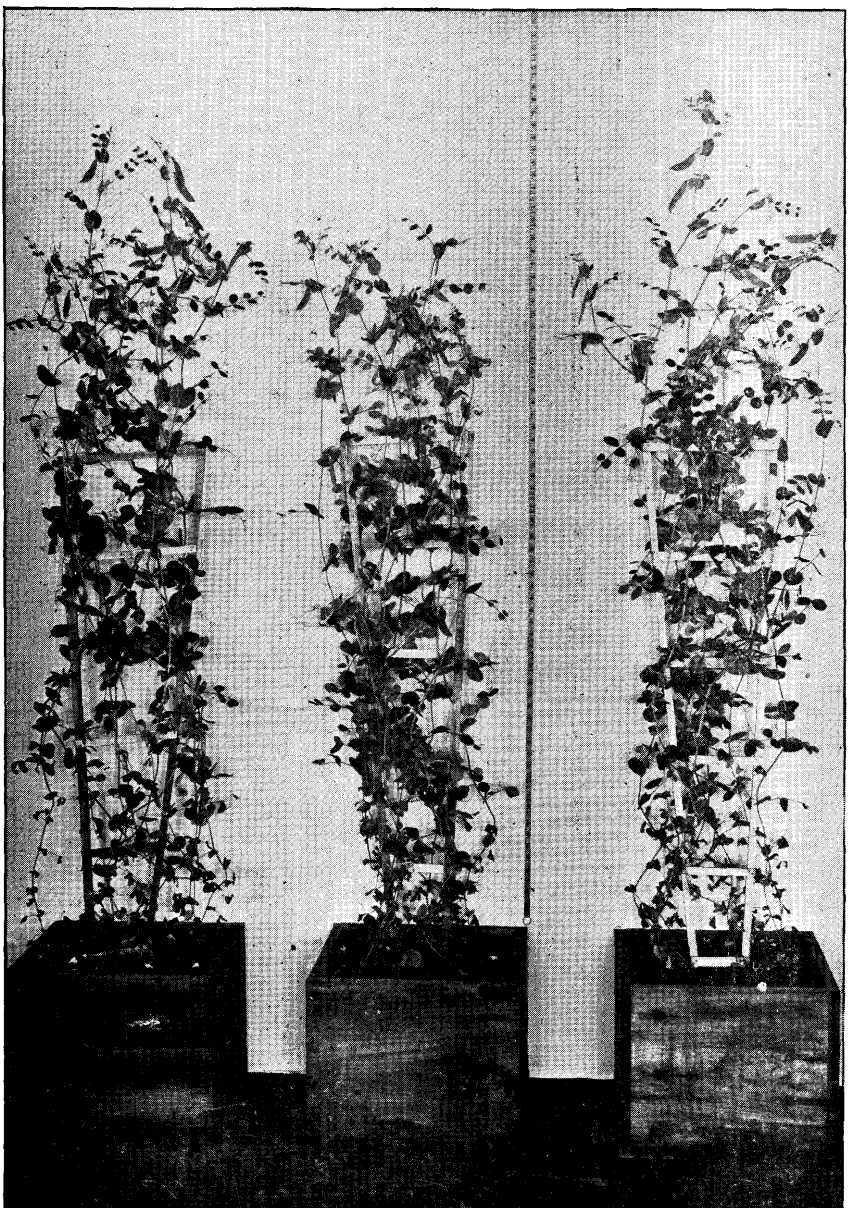
**CROP, BEANS.**

*Manure*,—Nitrate of Soda, Muriate of Potash, Acidulated S. C. Rock Phosphate.



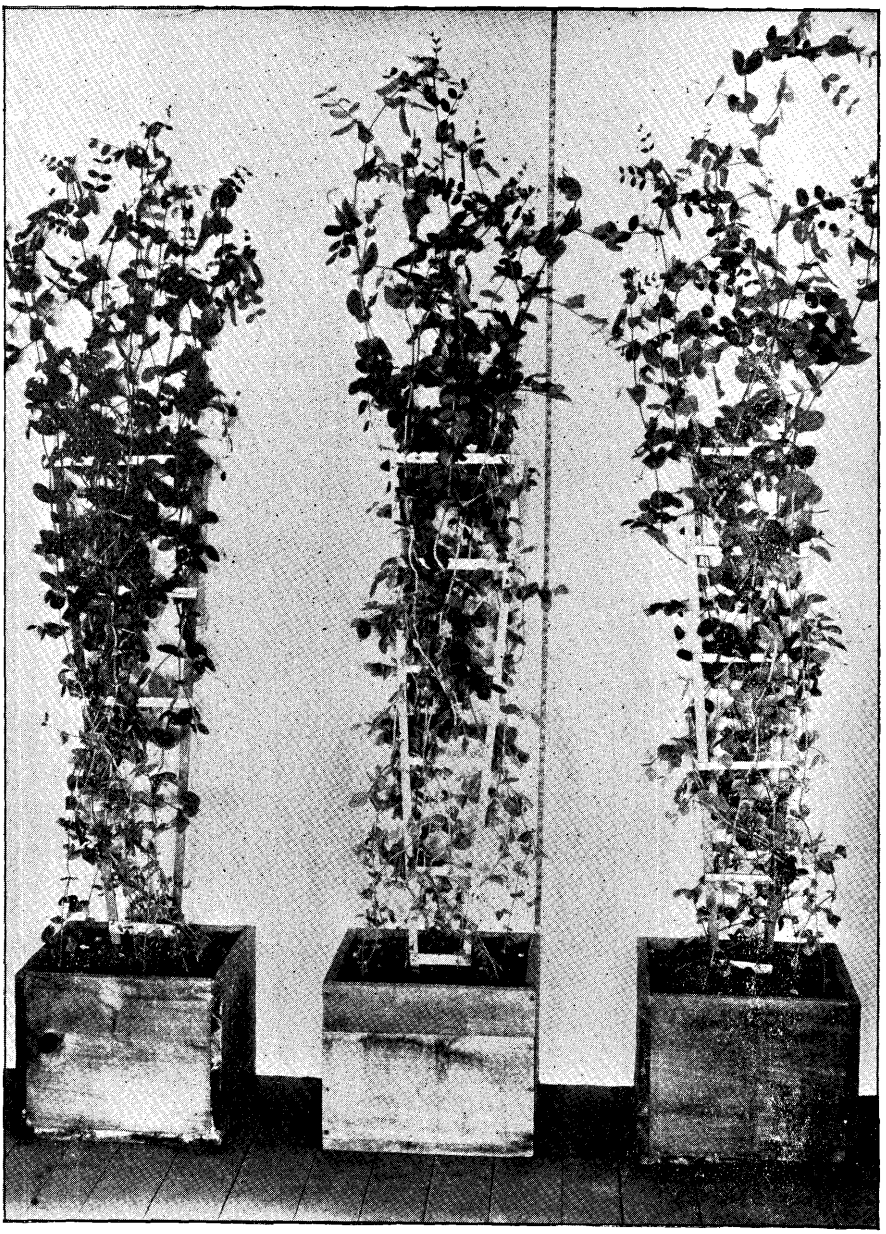
**CROP, PEAS.**

*Manure*,—Nitrate of Soda, Muriate of Potash.



**CROP, PEAS.**

*Manure*,—Nitrate of Soda, Muriate of Potash, S. C. Rock Phosphate.



**CROP, PEAS.**

*Manure*,—Nitrate of Soda, Muriate of Potash, Acidulated S. C. Rock Phosphate.

TABLE V.

EXPERIMENT WITH PEAS.

| Set. | Manure per box. | No. of box. | Total crop. | Peas in pod. |
|---|---|---|---|---|
| I E.. | Nitrate of soda, 8.5 grams, and muriate of potash, 2.6 grams. | 1 | 35 grams | 7 grams |
| | | 2 | 41 grams | 11 grams |
| | | 3 | 45 grams | 14 grams |
| | | Total.. | 121 grams | 32 grams |
| II E.. | Nitrate of soda, 8.5 grams, muriate of potash, 2.6 grams, and South Carolina rock, 17.0 grams. | 1 | 73 grams | 16 grams |
| | | 2 | 68 grams | 17 grams |
| | | 3 | 70 grams | 17 grams |
| | | Total.. | 221 grams | 50 grams |
| III E.. | Nitrate of soda, 8.5 grams, muriate of potash, 2.6 grams, and acidulated South Carolina rock, 28.5 grams. | 1 | 83 grams | 16 grams |
| | | 2 | 78 grams | 17 grams |
| | | 3 | 84 grams | 18 grams |
| | | Total.. | 245 grams | 51 grams |

Dry matter.

Set I E.. ..... 112.7 grams
Set II E..... 196.7 grams
Set III E.. ..... 228.6 grams

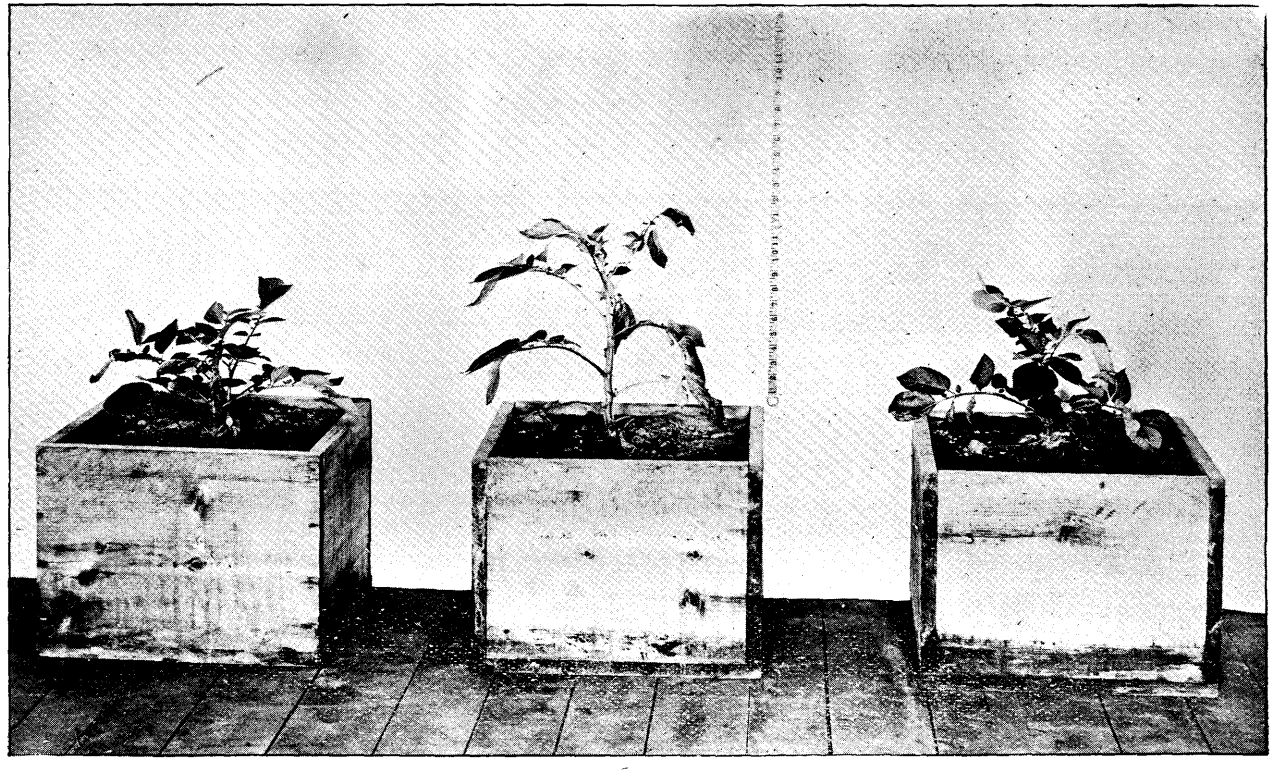
TABLE VI.

EXPERIMENT WITH POTATOES.

| Set. | Manure per box. | No. of box. | Tubers. |
|---|---|---|---|
| I F.. | Nitrate of soda, 8.5 grams, and muriate of potash, 2.6 grams. | 1 | 162 grams |
| | | 2 | 170 grams |
| | | 3 | 195 grams |
| | | Total.. | 527 grams |
| II F.. | Nitrate of soda, 8.5 grams, muriate of potash, 2.6 grams, and South Carolina rock, 17.0 grams. | 1 | 211 grams |
| | | 2 | 177 grams |
| | | 3 | 152 grams |
| | | Total.. | 540 grams |
| III F.. | Nitrate of soda, 8.5 grams, muriate of potash, 2.6 grams, and acidulated South Carolina rock, 28.5 grams. | 1 | 326 grams |
| | | 2 | 321 grams |
| | | 3 | 361 grams |
| | | Total.. | 1008 grams |

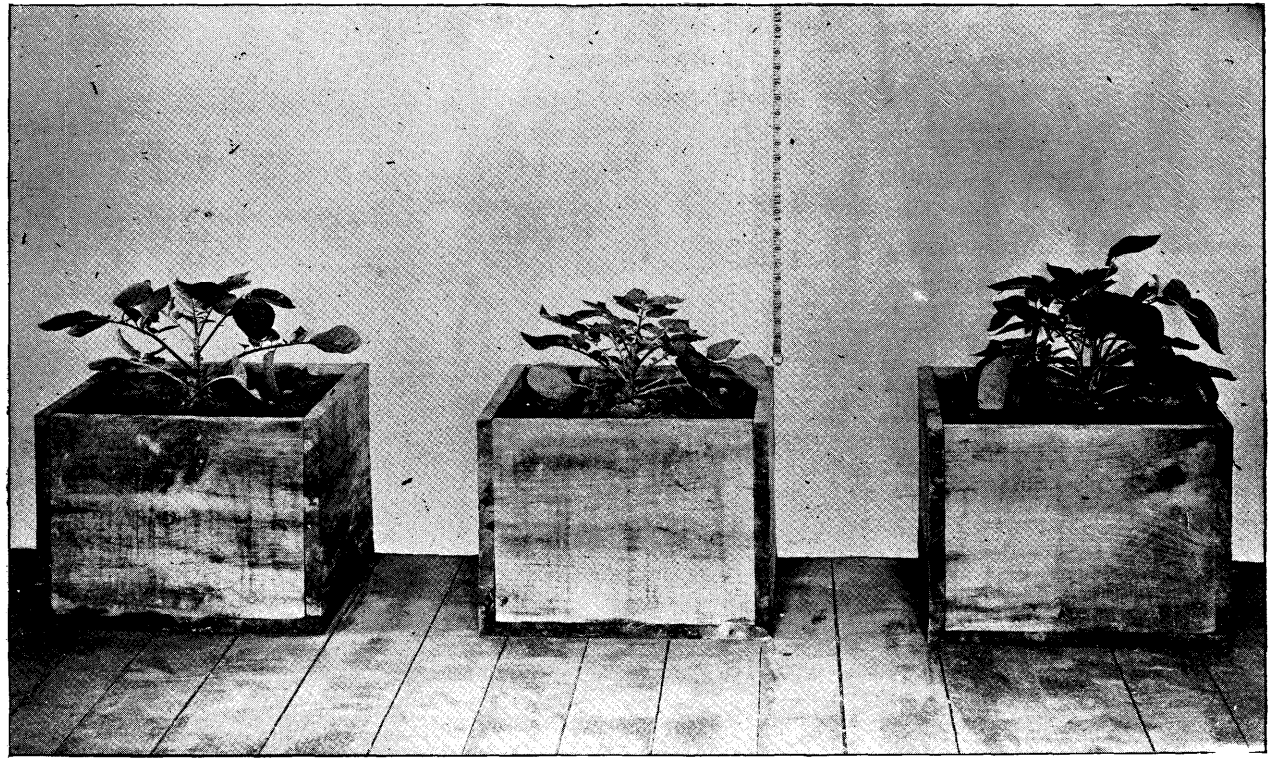
Dry matter, including tops.

Set I F ..... 113.3 grams
Set II F ..... 114.6 grams
Set III F ..... 223.6 grams



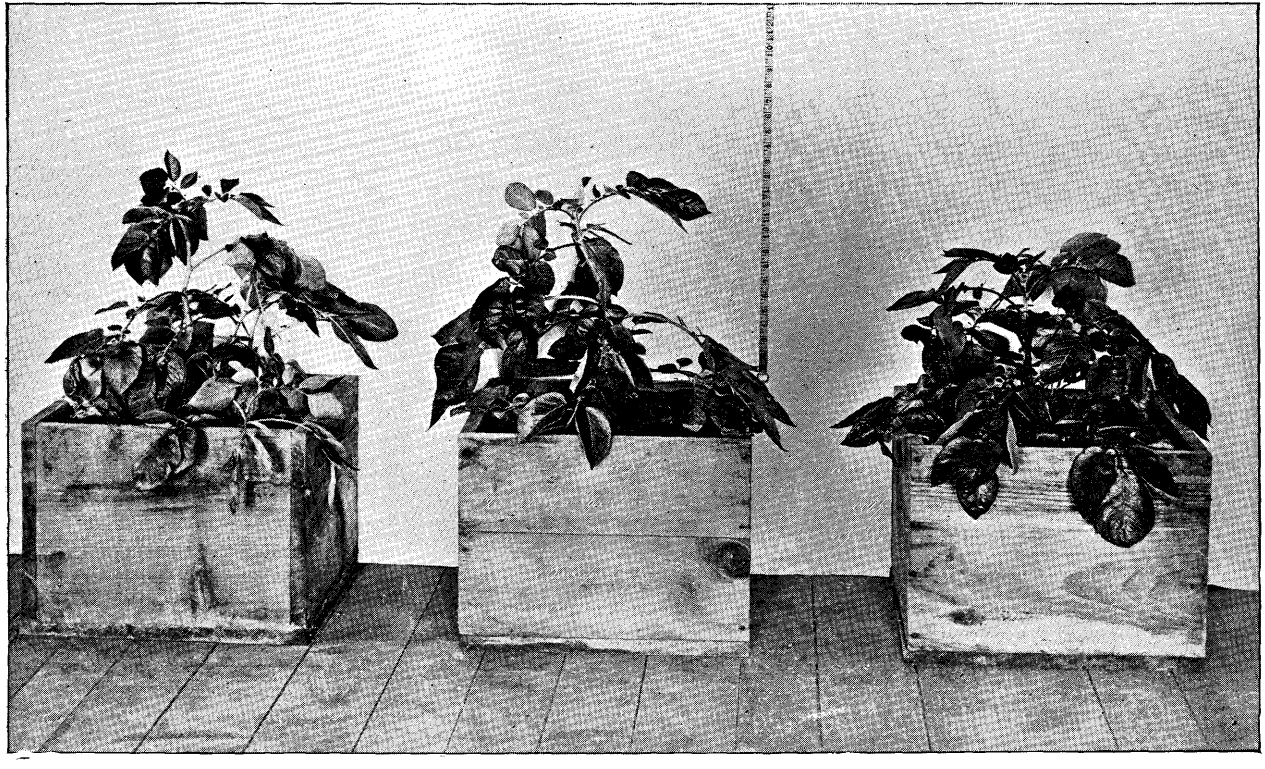
**CROP, POTATOES.**

*Manure*,—Nitrate of Soda, Muriate of Potash.



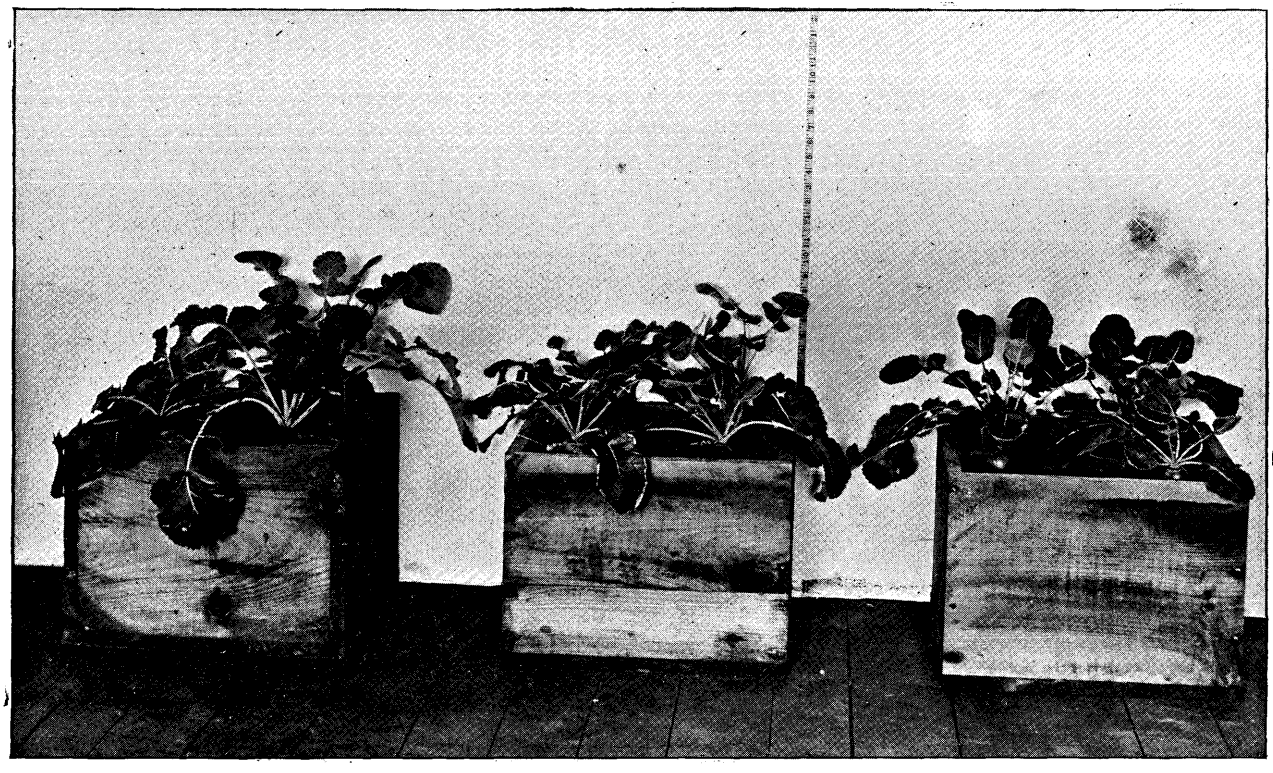
**CROP, POTATOES.**

*Manure*,—Nitrate of Soda, Muriate of Potash, S. C. Rock Phosphate.



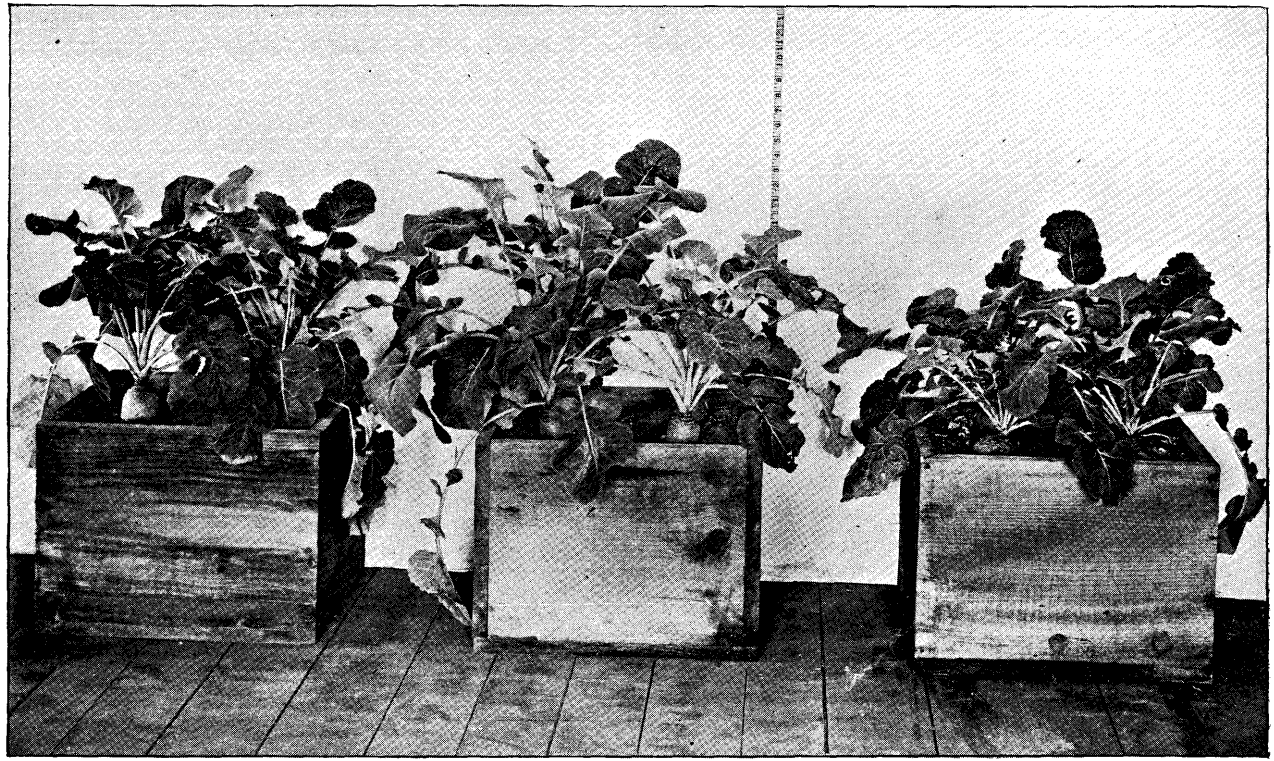
**CROP, POTATOES.**

*Manure*,—Nitrate of Soda, Muriate of Potash, Acidulated S. C. Rock Phosphate.



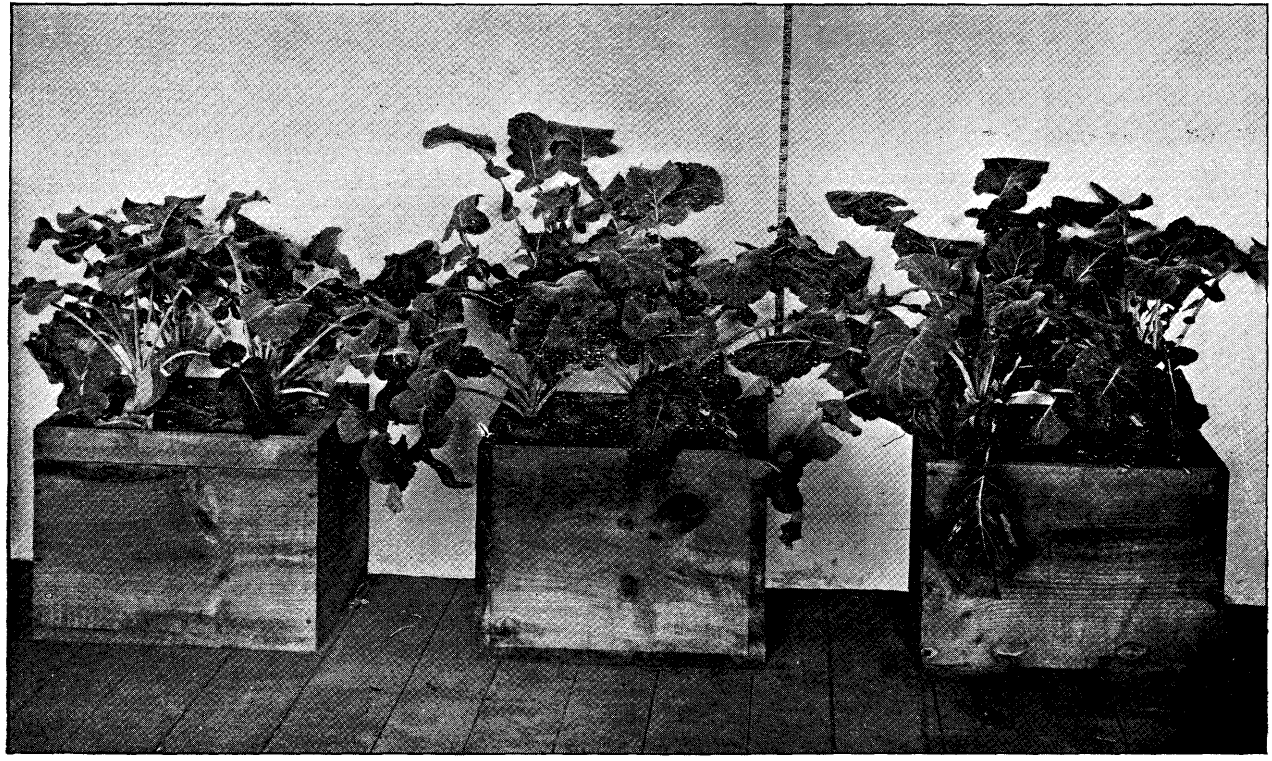
**CROP, TURNIPS.**

*Manure*,—Nitrate of Soda, Muriate of Potash.



**CROP, TURNIPS.**

*Manure*,—Nitrate of Soda, Muriate of Potash, S. C. Rock Phosphate.



**CROP, TURNIPS.**

*Manure*,—Nitrate of Soda, Muriate of Potash, Acidulated S. C. Rock Phosphate.

## TABLE VII.

EXPERIMENT WITH TURNIPS.

| Set. | Manure per box. | No. of box. | Total crop. | Roots. |
|---|---|---|---|---|
| I G.. | Nitrate of soda, 8.5 grams, and muriate of potash, 2.6 grams. | 1 | 398 grams | 249 grams |
| | | 2 | 358 grams | 233 grams |
| | | 3 | 542 grams | 340 grams |
| | | Total.. | 1298 grams | 822 grams |
| II G.. | Nitrate of soda, 8.5 grams, muriate of potash, 2.6 grams, and South Carolina rock, 17.0 grams. | 1 | 914 grams | 504 grams |
| | | 2 | 907 grams | 616 grams |
| | | 3 | 947 grams | 571 grams |
| | | Total.. | 2768 grams | 1691 grams |
| III G.. | Nitrate of soda, 8.5 grams, muriate of potash, 2.6 grams, and acidulated South Carolina rock, 28.5 grams. | 1 | 1055 grams | 600 grams |
| | | 2 | 819 grams | 406 grams |
| | | 3 | 925 grams | 438 grams |
| | | Total.. | 2799 grams | 1444 grams |

Dry matter.

Set I G ..... 154.4 grams
Set II G ..... 304.1 grams
Set III G ..... 270.4 grams

The following table gives a partial chemical analysis of the total crop produced in each set of boxes, calculated on the water free substance.

TABLE VIII.

ANALYSIS OF ENTIRE CROP CALCULATED TO A WATER FREE BASIS.

| | Nitrogen. N.—%. | Ash—%. | Sand and silica—%. | Potash $K_2O$—%. | Soda $Na_2O$—%. | Iron and alumina $Fe_2O_3$ $Al_2O_3$—%. | Phosphoric acid $P_2O_5$—%. | Sulphuric acid $SO_3$—%. | Chlorine Cl—%. |
|---|---|---|---|---|---|---|---|---|---|
| Wheat, Set I A. | 1.36 | 4.19 | 1.23 | 1.37 | .08 | .24 | .14 | .14 | .36 |
| II A. | 1.34 | 4.05 | 1.27 | 1.29 | .13 | .21 | .21 | .17 | .34 |
| III A. | 1.28 | 4.87 | 1.95 | 1.23 | .07 | .31 | .39 | .25 | .30 |
| Barley, Set I B. | 1.65 | 8.19 | .60 | 3.13 | .49 | .27 | .20 | .14 | 2.24 |
| II B. | 1.48 | 7.61 | 1.18 | 2.71 | .44 | .29 | .19 | .20 | 1.76 |
| III B. | 1.57 | 9.23 | .83 | 2.33 | 1.62 | .14 | .29 | .40 | 2.60 |
| Corn, Set I C. | 1.55 | 9.33 | 5.03 | 1.35 | .05 | – | .21 | .16 | .20 |
| II C. | 1.49 | 6.85 | 3.31 | 1.31 | .08 | .38 | .27 | .17 | .21 |
| III C. | 0.84 | 5.40 | 1.47 | 1.79 | .10 | .21 | .29 | .19 | .49 |
| Beans, Set I D. | 3.75 | 19.23 | 9.63 | 1.98 | .16 | – | .27 | .23 | |
| II D. | 3.65 | 18.50 | 8.99 | 1.92 | .18 | – | .31 | .27 | |
| III D. | 2.80 | 12.43 | 4.52 | 2.16 | .07 | .49 | .41 | .26 | .59 |
| Peas, Set I E. | 2.52 | 8.34 | .76 | 2.03 | .28 | .17 | .30 | .18 | .91 |
| II E. | 2.37 | 9.57 | 1.17 | 2.26 | .33 | .37 | .30 | .20 | .98 |
| III E. | 2.19 | 9.05 | .71 | 2.23 | .34 | .61 | .28 | .30 | 1.03 |
| Potatoes, Set I F. | 1.69 | 11.46 | 5.88 | 2.79 | .11 | .55 | .28 | .23 | .45 |
| II F. | 2.02 | 10.62 | 4.28 | 2.95 | .14 | .47 | .29 | .32 | .51 |
| III F. | 2.03 | 11.94 | 4.34 | 3.49 | .21 | .39 | .40 | .29 | .69 |
| Turnips, Set I G. | 2.87 | 12.30 | 1.03 | 3.22 | 1.03 | .25 | .48 | .20 | 1.38 |
| II G. | 2.75 | 12.50 | 1.79 | 3.18 | 1.62 | .23 | .70 | .40 | 1.28 |
| III G. | 3.37 | 13.33 | 1.01 | 3.60 | 1.89 | .22 | .76 | 1.20 | 1.22 |

While it may not be desirable to draw definite conclusions from so small an amount of data as is furnished by the above described experiments, there are some points which under the conditions of these experiments the results appear to bring out sharply.

1st. Different crops showed a decided difference in their powers of obtaining phosphoric acid from crude, finely ground South Carolina rock. Wheat, barley, corn, peas and turnips apparently appropriated the insoluble phosphoric acid from this source with greater or less ease, while beans and potatoes derived no benefit from it.

2d. The greatest practical advantage derived from the use of fine-ground South Carolina rock was with the turnips. With this crop a larger weight of dry matter and also a larger weight of fresh roots was obtained with insoluble phosphoric acid from the finely ground South Carolina rock than with an equal amount of soluble phosphoric acid from acidulated South Carolina rock.

3d. The indications point to a profitable use of finely ground South Carolina rock as a manure for barley and peas as well as turnips.

4th. The acidulated South Carolina rock in these experiments apparently depressed the yield of grain with barley while largely increasing the amount of straw. With wheat both grain and straw were largely increased and in about the same proportion.

## ANALYSES OF CATTLE FOODS.

W. H. JORDAN, J. M. BARTLETT, L. H. MERRILL.

NOTE—The experiments in connection with which these analyses were made were planned largely by the Station Director. The analyses were entirely executed by the Station chemists. The Director is responsible for this discussion of the results.

It seems proper, because of certain views now held by agricultural chemists, that the following statement of the analyses of various cattle foods should be accompanied by explanations.

The opinion is now frequently expressed that to continue the analysis of our common cattle foods after the existing usual methods, simply for the sake of analysis, is largely a waste of time. This opinion is undoubtedly correct, and for the following reasons: 1st. Enough analyses have been made to establish the average composition of our common feeding stuffs as closely as is practicable or useful. Additional analyses will change the general averages very little.

2nd. Existing methods of food analysis are furnishing no new information about food compounds and are entirely inadequate to

aid in solving the problems in animal nutrition which now most urgently demand consideration.

There is an increasing need for a more intimate study of the properties of the individual compounds of cattle foods and their relation to nutritive processes.

Nevertheless, analyses of the foods involved in experimental work even by our confessedly unsatisfactory methods, are both necessary and useful, because they disclose certain facts which are fundamental conditions, and a knowledge of which is essential to successful plans and to any well grounded conclusions.

The analyses herewith reported have nearly all been occasioned by experimental work either in studying crop production or along the line of animal nutrition. However, some attempt has been made to step outside the beaten path by endeavoring to ascertain the amount present of those carbohydrates whose properties and functions are to a large degree understood. Certain sugars and the starchs are among our best known vegetable compounds, not only as to their constitution but also as to their offices in the animal body. We have every reason to regard them as the most valuable of the nutrients usually classed under the term "nitrogen-free-extract," and it is reasonable to believe that the nutritive value of this nitrogen-free-extract varies materially according as it contains largely such compounds as sucrose, glucose and starch, which are entirely digestible and directly useful, or is almost wholly made up of bodies of which we have scanty knowledge, the little we do know not being favorable to their efficiency as food. Therefore in the experiments which this Station has made with the corn crop, not only have the regular analyses been performed, but the amounts of sugars and starch have been ascertained as closely as existing methods would allow.

## THE COMPOSITION OF FODDERS AND SILAGE FROM THE CORN (MAIZE) PLANT.

The analyses which appear below have been made during the past three years in connection with experiments in the value of the corn plant as a source of cattle food. They have been necessary in order to know the amount and general character of the dry matter produced, and have been required in the digestion and feeding experiments.

## TABLE IX.

COMPOSITION OF CORN FODDER AND CORN SILAGE FROM CORN GROWN ON THE STATION EXPERIMENTAL PLATS.

| | Parts in 100 of the Green or Air-Dry Material. | | | | | | Parts in 100 of the Water-Free Material. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Water. | Ash. | Protein—N×6.25. | Fiber. | Nitrogen-free-extract. | Fat. | Ash. | Protein. | Fiber. | Nitrogen-free-extract. | Fat. |
| **Crop of 1891.** | | | | | | | | | | | |
| CXLVII—Southern Corn, large white, immature, no ears | 86.48 | .99 | 1.70 | 4.33 | 6.22 | .28 | 7.31 | 12.25 | 32.06 | 46.32 | 2.06 |
| CXLVI—Maine Field Corn, mature, kernels glazed | 86.48 | .84 | 1.70 | 4.13 | 6.57 | .28 | 6.25 | 12.22 | 30.56 | 48.95 | 2.02 |
| CXLVIII—Sweet Corn, mature | 86.19 | .87 | 1.92 | 3.91 | 6.73 | .45 | 6.29 | 13.96 | 27.74 | 48.72 | 3.29 |
| **Crop of 1892.** | | | | | | | | | | | |
| CLX—Southern Corn, large white, immature, no ears | 85.33 | 1.21 | 1.78 | 4.03 | 7.37 | .28 | 8.24 | 12.14 | 27.45 | 50.22 | 1.95 |
| CLXI—Southern Corn, large white, immature, no ears | 85.85 | 1.04 | 1.75 | 4.08 | 6.93 | .36 | 7.38 | 12.24 | 28.86 | 48.96 | 2.56 |
| CLXII—Maine Field Corn, mature, kernels partly glazed | 79.11 | 1.25 | 2.26 | 3.86 | 12.84 | .68 | 5.98 | 10.83 | 18.48 | 61.46 | 3.25 |
| CLXIII—Maine Field Corn, mature, kernels partly glazed | 81.38 | 1.10 | 2.15 | 3.92 | 10.93 | .52 | 5.89 | 11.53 | 21.04 | 58.74 | 2.80 |
| CLXX—Southern Corn silage, from CLX | 86.50 | 1.11 | 1.69 | 4.03 | 6.30 | .37 | 8.21 | 12.52 | 29.85 | 46.64 | 2.78 |
| CLXXVI—Southern Corn silage, from CLXI | 83.80 | 1.03 | 2.60 | 4.89 | 6.94 | .74 | 6.35 | 16.02 | 30.17 | 42.84 | 4.62 |
| CLXXI—Maine Field Corn silage, from CLXII | 77.70 | 1.28 | 2.25 | 4.73 | 13.23 | .81 | 5.74 | 10.10 | 21.21 | 59.31 | 3.64 |
| CLXXIII—Maine Field Corn silage, from CLXIII | 79.60 | .97 | 2.09 | 4.72 | 11.81 | .81 | 4.74 | 10.23 | 23.13 | 57.91 | 3.99 |
| **Crop of 1893.** | | | | | | | | | | | |
| CCXXIV—Southern Corn, large white, immature, no ears | 84.55 | 1.29 | 1.57 | 4.35 | 7.90 | .34 | 8.34 | 10.16 | 28.18 | 51.10 | 2.22 |
| CCXXV—Southern Corn, large white, immature, no ears | 83.42 | 1.17 | 2.04 | 4.36 | 8.62 | .39 | 7.06 | 12.32 | 26.31 | 51.94 | 2.37 |
| CCXXVI—Maine Field Corn, mature, kernels partly glazed | 80.51 | 1.25 | 2.37 | 4.10 | 11.27 | .50 | 6.41 | 12.16 | 21.06 | 57.81 | 2.56 |
| CCXXVII—Maine Field Corn, cut August 15th, immature, no kernels formed | 88.29 | 1.09 | 1.75 | 3.10 | 5.46 | .30 | 9.33 | 14.96 | 26.51 | 46.60 | 2.60 |
| CCXXVIII—Maine Field Corn, cut August 28th | 82.50 | 1.14 | 2.05 | 4.08 | 9.71 | .52 | 6.50 | 11.74 | 23.31 | 55.50 | 2.95 |
| CCXXIX—Maine Field Corn, cut September 4th | 80.45 | 1.21 | 2.22 | 3.85 | 11.68 | .59 | 6.21 | 11.38 | 19.67 | 59.74 | 3.00 |
| CCXXX—Maine Field Corn, cut September 12th | 76.83 | 1.29 | 2.22 | 4.48 | 14.50 | .68 | 5.58 | 9.57 | 19.33 | 62.52 | 3.00 |
| CCXXXI—Maine Field Corn, cut September 21st, mature, kernels partly glazed, rapidly dried | 74.66 | 1.50 | 2.34 | 4.71 | 16.04 | .75 | 5.91 | 9.23 | 18.60 | 63.30 | 2.96 |
| CCXXXII—Maine Field Corn, same as CCXXXI, dried slowly, without heat | 78.24 | 1.55 | 2.29 | 4.67 | 12.63 | .62 | 7.14 | 10.54 | 21.39 | 58.08 | 2.85 |

The above mass of figures give information on two points which are worthy of consideration by Maine farmers; viz: (1) The comparative composition of the large Southern varieties of corn, which are so often grown in Maine for fodder purposes, and the Northern field corn such as matures in Maine, which is regarded by many as the more valuable variety for use in this State.

(2) The effect of the degree of maturity of the corn plant upon its composition. The large varieties of corn *must* be cut in this State when very immature, and our own small field corn *may* be cut in any stage of maturity. What is the effect of immaturity upon the value of the plant as a food?

THE COMPARATIVE COMPOSITION OF THE LARGE SOUTHERN CORN AND THE SMALLER MAINE FIELD CORN, THE FORMER IMMATURE WHEN CUT AND THE LATTER MATURE.

Observations on these two varieties of corn have been made for five years and in the averages given below, there are included analyses already published in the reports of this Station for 1889 and 1891. The analyses for the years 1888, 1890 and 1891 are averaged separately from those of 1892 and 1893 for the reason that the samples for the first three years were obtained in a way that probably allowed a material change in their composition. In 1888, 1890 and 1891 several hundred pounds of the green plant were stored under cover in such a manner as to partially air-dry without any apparent fermentation or decay, and the fodder was not analyzed until it had stood in this condition for several months, when it was used for digestion experiments. Doubtless these fodders had suffered changes incident to the slow drying of large succulent plants, even under the most favorable conditions. In 1892 and 1893, immediately upon cutting in the field, several hundred pounds of the perfectly fresh material were finely chopped and crushed, a portion of which was rapidly dried in a steam closet. Facts given later indicate that the latter method of procedure much more fully preserved the original condition of the plant than the former, and so the analyses for the last two years are the more trustworthy as a means of ascertaining the nature of the growth which actually occurred.

It should be remarked, also that while the crops of Maine field corn must be regarded as mature in 1888, 1889 and 1890, they were much more heavily eared in 1892 and 1893.

TABLE X.

RELATIVE COMPOSITION OF TWO VARIETIES OF CORN (GREEN).

| *Crops of 1888, 1890 and 1891—Average.* | In 100 parts fresh substance. | | | | | | |
|---|---|---|---|---|---|---|---|
| | Water. | Dry substance. | Ash. | Protein N × 6.25. | Fiber. | Nitrogen-free-extract | Fat. |
| Southern Corn, immature | 86.41 | 13.59 | 1.05 | 1.61 | 4.28 | 6.30 | .35 |
| Maine Field Corn, mature | 84.43 | 15.57 | 1.13 | 1.92 | 4.39 | 7.73 | .40 |
| Excess in Field Corn | - | 1.98 | .08 | .31 | .11 | 1.43 | .05 |
| *Crops of 1892 and 1893—Average.* | | | | | | | |
| Southern Corn, immature | 84.80 | 15.20 | 1.18 | 1.78 | 4.20 | 7.70 | .34 |
| Maine Field Corn, mature | 78.91 | 21.09 | 1.28 | 2.28 | 4.15 | 12.77 | .61 |
| Excess in Field Corn | - | 5.89 | .10 | .50 | —.05 | 5.07 | .27 |

It appears from these averages that under the conditions existing in Maine, which require the cutting of the large varieties of corn in an immature state, the Maine field corn which reaches maturity, contains the larger percentage of dry matter. This is true especially of the years 1892 and 1893, when the latter crop was more perfectly developed. Again, the excess of dry matter in the Maine field corn consists almost wholly of the non-nitrogenous compounds classed under the head of nitrogen-free-extract. The characteristic differences in the composition of the dry substance of the two varieties of corn are more clearly seen by a comparison in the water-free condition.

TABLE XI.

COMPOSITION OF THE WATER-FREE SUBSTANCE OF TWO VARIETIES OF CORN.

| Average for 1892 and 1893. | In 100 parts water-free substance. | | | | |
|---|---|---|---|---|---|
| | Ash. | Protein. | Fiber. | Nitrogen-free-extract. | Fat. |
| Southern Corn, immature | 7.76 | 11.72 | 27.70 | 50.54 | 2.28 |
| Maine Field Corn, mature | 6.05 | 10.94 | 19.79 | 60.33 | 2.89 |
| Differences | +.71 | +.78 | +7.91 | —9.89 | —.61 |

The dry substance of the larger and immature corn contains more ash protein and fiber and less nitrogen-free-extract and fat. The much larger percentage of fiber and greatly less percentage of nitrogen-free-extract are the noteworthy differences.

## THE INFLUENCE OF MATURITY UPON THE COMPOSITION OF THE CORN PLANT.

The figures above cited compare two varieties of corn in unlike stages of maturity and show important differences in composition.

Is this a question of maturity or of variety? In order to obtain testimony on this point, in 1893 field No. 1 of Maine field corn was cut in five different lots, ranging in times of cutting from August 15th to September 21st, and in stage of growth from the early formation of the ear to full maturity. The analyses of samples from these different cuttings appear in Table 1 but are reproduced below.

TABLE XII.

COMPOSITION OF CORN CUT AT DIFFERENT PERIODS OF GROWTH.

| | In 100 parts fresh substance. | | | | | | |
|---|---|---|---|---|---|---|---|
| | Water. | Dry substance. | Ash. | Protein N × 6.25. | Fiber. | Nitrogen-free-extract. | Fat. |
| Maine Field Corn, cut August 15th.. | 88.29 | 11.71 | 1.09 | 1.75 | 3.10 | 5.46 | .30 |
| August 28th.. | 82.50 | 17.50 | 1.14 | 2.05 | 4.08 | 9.71 | .52 |
| Sept. 4th . ... | 80.45 | 19.55 | 1.21 | 2.22 | 3.85 | 11.68 | .59 |
| Sept. 12th .... | 76.83 | 23.17 | 1.29 | 2.22 | 4.48 | 14.50 | .68 |
| Sept. 21st .... | 74.66 | 25.34 | 1.50 | 2.34 | 4.71 | 16.04 | .75 |

The immature and mature corn differ in the following essential particulars:

(1) The mature corn is less watery: i. e. it contains a much larger percentage of dry substance. During the thirty days before the mature crop was harvested there was a continuous and large increase in the percentage of dry matter. It will appear later that this was due to an actual growth of dry matter, rather to a drying out of the water with a diminished weight of crop.

(2) This increase was most largely from the growth of compounds classed as nitrogen-free-extract, such as starch, sugar and allied bodies.

This is most clearly shown by the arrangement of figures in Table 13:

TABLE XIII.

RELATION OF DIFFERENT CLASSES OF COMPOUNDS IN CORN CUT AT DIFFERENT PERIODS OF GROWTH.

| | In 100 pounds of green corn as cut. | | |
|---|---|---|---|
| | Pounds of dry matter. | Pounds of nitrogen-free-extract. | Pounds of all compounds other than nitrogen-free-extract. |
| Lot cut August 15th, very immature | 11.71 | 5.46 | 6.25 |
| August 28th | 17.50 | 9.71 | 7.79 |
| September 4th | 19.55 | 11.68 | 7.87 |
| September 12th | 23.17 | 14.50 | 8.67 |
| September 21st, mature | 25.34 | 16.04 | 9.30 |

Lot cut August 15th .....Other compounds: Nitrogen-free-extract:: 100: 87.3
Lot cut August 28th .....Other compounds: Nitrogen-free-extract:: 100:124.6
Lot cut September 4th .....Other compounds: Nitrogen-free-extract:: 100:148.4
Lot cut September 12th .....Other compounds: Nitrogen-free-extract:: 100:167.2
Lot cut September 21st..... ...Other compounds: Nitrogen-free-extract:: 100:175.4

The answer to our question must be, then, that the changes which are shown in the experiment with Maine field corn to be due to increasing maturity are those which exactly explain the differences between the two varieties of corn compared.

It seems impossible to avoid the conclusion that the inferiority of the larger Southern corn, when compared pound for pound with our smaller Northern variety, is caused in part, at least, by the necessity of harvesting it in an immature condition.

## TO THE FORMATION OF WHAT COMPOUNDS IS DUE THE LARGE RELATIVE INCREASE OF NITROGEN-FREE-EXTRACT AS THE CORN PLANT APPROACHES MATURITY.

As before stated an attempt has been made to extend these analyses beyond the usual routine. This has been in the way of determinations of the sugars and starch, in order to learn the extent to which these more valuable carbohydrates are present in the corn plant, and the influence of certain conditions upon their amount.

It is believed that the percentages of starch given in this connection much more nearly represent the actual amounts present in the fodders analyzed than when the ordinary method of analysis is followed.*

The method of starch determination generally used is to treat the substance for a given period with hot dilute acid, which results in the conversion not only of starch but partly, at least, of cellulose and gums into glucose. The amount of this sugar is ascertained by its action in precipitating copper oxide from Fehling's solution and all the sugar thus found is assumed to come from starch alone, which is far from the truth. If we did not have reason to believe that starch is greatly superior in food value to the cellulose, gums, etc., which suffer hydrolysis by the action of mineral acids, this assumption would be less fatal to correct conclusions. But so long as starch appears to be entirely digestible, while these other bodies certainly are not, and so long as there is good reason for regarding digested cellulose and gums as less efficient nutrients than digested starch, it is certainly nothing less than absurd to go on assuming that all the sugar produced when vegetable substances are treated with mineral acids comes from starch. The method used here was the conversion of the starch into water-soluble compounds through the action of a ferment known as diastase In the case of a few samples the acid and diastase methods have been compared.

TABLE XIV.

COMPARISON OF PERCENTAGES OF STARCH AS FOUND BY THE ACID AND BY THE DIASTASE METHODS.

| | In 100 parts water-free substance. | | | |
|---|---|---|---|---|
| | Total nitrogen-free extract. | Starch, by diastase method. | "Starch," by acid method. | Excess, by acid method. |
| CLX—Southern Corn, immature, no ears, Field I .... | 50.22 | 2.03 | 14.98 | 12.95 |
| CLXI—Southern Corn, immature, no ears, Field II.. | 48.96 | 2.24 | 15.27 | 13.03 |
| CLXII—Maine Field Corn, mature, Field I..... | 61.64 | 18.58 | 30.32 | 11.74 |
| CLXIII—Maine Field Corn, mature, Field II..... ... | 58.74 | 12.66 | 23.97 | 11.31 |
| CLXX—Southern Corn silage, from CLX..... .... | 46.64 | 3.70 | 14.63 | 10.93 |
| CLXXVI—Southern Corn silage, from CLXI..... ... | 42.84 | 3.56 | 14.90 | 11.35 |
| CLXXI—Maine Field Corn silage, from CLXII..... | 59.31 | 18.32 | 29.50 | 11.18 |
| CLXXIII—Maine Field Corn silage, from CLXIII ... | 57.91 | 17.43 | 30.00 | 12.57 |

*Mr. Bartlett describes his methods on subsequent pages of this report.

The percentages of "starch" by the acid method are greatly but quite uniformly larger than by the diastase method, this excess ranging between 10.93 to 13.03 per cent of the total substance of the plant, or from 24.5 per cent to 31 per cent of the nitrogen-free-extract.

This uniformity of difference in the two methods, while proving nothing, is certainly favorable to confidence in the approximate accuracy of the diastase method, especially where the results range from 2 to 18 per cent. If, for instance, the low percentages of starch in the case of samples CLX CLXI, CLXX and CLXXVI and the high percentages in the other samples were due to the less perfect extraction of starch in the former, this fact would be disclosed by an increased excess with the acid method. As a matter of fact the acid method shows an excess only .36 per cent larger with the samples low in starch by the diastase methed. Moreover, Mr. Bartlett's report shows that an increase in the time of the action of the diastase beyond a certain limit failed to produce higher results, which makes it improbable that an undissolved residue of starch still existed.

The percentages of sugar and starch in all the samples analyzed in 1892 and 1893 appear in Table XV. In Table XVI are the averages for the immature Southern Corn and the mature Maine Field Corn.

TABLE XV.

PERCENTAGES OF SUGARS AND STARCH IN THE WHOLE CORN PLANT.

| Crop of 1892. | Parts in 100 of water-free substance. | | | | Parts of sugar & starch in 100 nitrogen-free-extract. |
|---|---|---|---|---|---|
| | Sugar. | Starch. | Total sugar and starch. | Total nitrogen-free extract. | |
| Southern Corn, immature ..... Field 1.. | 13.03 | 2.03 | 15.06 | 50.22 | 30.0 |
| Field 2.. | 10.60 | 2.24 | 12.84 | 48.96 | 26.2 |
| Maine Field Corn, mature ..... Field 1.. | 11 88 | 18.58 | 30.46 | 61.46 | 49.5 |
| Field 2.. | 11.40 | 12.66 | 24.06 | 58.74 | 40.9 |
| Southern Corn, silage..... from Field 1.. | – | 3.70 | 3.70 | 46.64 | 7.9 |
| Field 2.. | – | 3.56 | 3.56 | 42.84 | 8.3 |
| Maine Field Corn, silage . .....from Field 1.. | – | 18.32 | 18.32 | 59.31 | 30.9 |
| Field 2.. | – | 17.43 | 17.43 | 57.91 | 30.1 |
| Crop of 1893. | | | | | |
| Southern Corn, immature ..... Field 1.. | 13.34 | – | 13.34 | 51.10 | 26.1 |
| Field 2.. | 14.45 | – | 14.45 | 51.94 | 27.8 |
| Maine Field Corn, mature ..... Field 2.. | 13.50 | 9.48 | 22.98 | 57.81 | 39.7 |
| Maine Field Corn, very immature, cut Aug. 15th ..... Field 1.. | 11.70 | – | 11.70 | 46.60 | 25.1 |
| Maine Field Corn, cut Aug. 28th ..... Field 1.. | 20.43 | 2.07 | 22.50 | 55.50 | 40.5 |
| Sept. 4th ..... Field 1.. | 20.60 | 4.89 | 25.49 | 59.74 | 42.7 |
| Sept. 12th ..... Field 1.. | 21.06 | 5.35 | 26.41 | 62.52 | 42.2 |
| Maine Field Corn, mature, cut Sept. 21st ..... Field 1.. | 16.50 | 15.37 | 31.87 | 63.30 | 50.3 |

TABLE XVI.

COMPARISON OF PERCENTAGES OF SUGARS AND STARCH IN THE DRY SUBSTANCE OF IMMATURE AND MATURE CORN PLANT.

| | Parts in 100 of water-free substance. | | | | |
|---|---|---|---|---|---|
| | Sugars. | Starch. | Total sugars and starch. | Total nitrogen-free extract. | Parts of sugars and starch in 100 parts of nitrogen-free extract. |
| Southern Corn, immature, no ears, four samples | 12.85 | 1.07 | 13.92 | 50.55 | 27.5 |
| Maine Field Corn, mature, full ears, four samples | 13.32 | 14.02 | 27.34 | 60.33 | 45.3 |
| Excess in the Maine Field Corn | .47 | 12.95 | 13.42 | 9.78 | 17.8 |

There is a constant and striking difference between the percentages of starch in the Southern corn and in the Maine field corn. They are much larger in the latter kind. This is due undoubtedly to greater maturity Only a small amount of starch appears to be deposited in the stalk and leaves, its rapid formation and storage in the plant apparently not beginning until the later development of the fruit or kernels. The analyses of Maine field corn in various stages show this fact very clearly. They also show that while a decrease in sugar occurred with the maturing of the ear, this was much less than the corresponding increase of starch, so that maturity shows a large excess over any other period of the more valuable carbohydrates.

There is, however, over four per cent less of sugar in the mature corn than at any period since the first one investigated. If the influence of maturity is in general to diminish the sugars present, less acidity of the silage would certainly result from the same cause. It appears, however, that there is not less, but rather more, sugar in the mature field corn than in the Southern corn, so that it is reasonable to expect, in these cases at least, fully as acid silage from the former variety.

## THE EFFECT OF SLOW DRYING UPON THE COMPOSITION OF A SAMPLE OF A SUCCULENT PLANT.

It must be well known to chemists that in order to secure a sample of a watery plant like green corn, which shall correctly represent its composition, it is necessary that this sample be dried as promptly and as rapidly as possible with a reasonable degree of heat.

One or two experiences at this Station serve, however, to forcibly illustrate this fact.

At the time of cutting the 1893 crop of Maine field corn at different stages of growth it was desired to save some of the first and last cuttings for digestion trials. No means being available for drying the needed quantity by artificial heat, five hundred pounds of each cutting were finely chopped and spread very thinly on a scaffold in the Station barn, over at least six hundred square feet of surface. The doors and windows of the barn were open, which allowed a free circulation of air, and under these conditions the material was allowed to become air-dry. This was accomplished with no apparent moulding or fermentation. Before spreading the last cutting, the chopped material was very thoroughly mixed and a smaller sample of about twenty pounds was selected and taken at once to the Station laboratory, where it was rapidly dried in a steam closet. The following are the analyses of the slowly and rapidly dried samples.

TABLE XVII.

INFLUENCE OF METHOD OF DRYING UPON COMPOSITION OF CORN PLANT.

| | In 100 parts fresh corn as cut. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water. | Dry substance. | Ash. | Protein. | Fiber. | Nitrogen-free extract. | Fat. | Sugars. | Starch. |
| Rapidly dried sample .... | 74.66 | 25.34 | 1.50 | 2.34 | 4.71 | 16.04 | .75 | 4.18 | 3.89 |
| Slowly dried sample..... | 78.24 | 21.76 | 1.55 | 2.29 | 4.67 | 12.63 | .62 | 1.72 | 3.66 |
| Difference ..... | | 3.58 | .05 | .05 | .04 | 3.41 | .13 | 2.46 | .23 |

It seems that for each hundred pounds of green corn 3.58 per cent of dry matter was lost in the process of slow drying under the most favorable circumstances. This was 14.13 per cent of the total dry matter in the fresh plant, which means that of each hundred pounds of dry substance originally in the plant only 85.87 pounds were saved.

It is interesting to note that this loss falls almost entirely on the nitrogen-free extract, or carbohydrates, more than two-thirds of it being actually accounted for by the diminished percentage of sugars.

## SUMMARY.

(1) The large varieties of corn which mature in the West and South must be harvested in Maine in a very immature condition, while the smaller Flint varieties may usually be allowed to stand until maturity.

(2) Under these conditions the smaller varieties of Flint corn had, when harvested, a much higher percentage of dry matter than the large immature Dent corn.

(3) The excess of dry matter in the Maine field corn consisted almost wholly of nitrogen-free-extract or the non-nitrogenous part of the plant.

(4) The dry matter of the large immature Dent corn contained .78 per cent more protein, 7.91 per cent more fiber and 9.89 per cent less nitrogen-free-extract.

(5) The development of the Flint corn to maturity caused a large relative production of nitrogen free extract as compared with an earlier stage of growth When in the silking stage the nitrogen-free-extract made up about 47 per cent of the dry matter of the plant, but this proportion increased to 63 per cent at maturity.

(6) The mature corn contained much the larger proportion of the more valuable carbohydrates, the sugars and starch. The starch especially increased, changing in an average of four samples from 1 per cent to 14 per cent of the dry substance of the plant.

(7) It appears from facts previously known, and from observations made in connection with these analyses that the diastase method of determining starch gives more nearly accurate results than the acid method.

(8) A material loss of dry matter is likely to occur when green corn fodder is slowly dried even under the most favorable conditions.

## METHODS OF DETERMINING SUGAR AND STARCH.

J. M. BARTLETT.

*Acid Method.* The sugars are determined by the method described in Report Maine Experiment Station, 1888, page 207 and the acid method employed to extract starch was that given on page 208 of same report, except that a one per cent instead of a one-half per cent HCl solution was used.

*Diastase Method.* Four grams of the finely ground fodder are digested with 50 c. c. water on the steam-bath for one hour, and then 50 c. c. of a freshly prepared extract of malt are added. (The extract is made by placing fifty grams of powdered malt in a liter flask, filling to the mark with distilled water, and then after standing two hours with frequent shaking, the liquid is clarified by passing through a double filter.)

The digestion with the malt is carried on at a temperature of 65° C for four or five hours, which is sufficient time to bring the starch all into a soluble condition, no more being obtained by treating longer. This was shown by several trials. This liquid is then passed through a linen filter and the residue thoroughly washed with warm water, bringing the volume up to about 200 c. c. To complete the conversion of the starch to sugar, 20 c. c. of HCl (Sp. gr. 1.125) are now added and the whole digested on the steam-bath for three hours. After cooling, the liquid is neutralized with caustic potash, then four or five c. c. basic acetate of lead are added, the volume made up to the mark (200 c. c.) and filtered through a dry filter; 25 c. c. are then treated with Fehling solution, in the usual manner. If any lead remains in the solution, it must be removed with sulphurous acid before the Fehling solution is added.

## DIGESTION EXPERIMENTS.

W. H. JORDAN.

The digestion experiments reported herewith show the results of three seasons work in that direction. They have been conducted largely as one means of studying the food value of the corn crop for cattle and because of the number of times the observations have been repeated with reasonably uniform results, they furnish to the Maine farmer data that may be considered fairly reliable. It has been deemed better to allow these figures to accumulate until they should constitute a safe basis for general statements, rather than publish them in a disconnected way as obtained. This has been also the more desirable because these trials are chiefly only a part of a general investigation covering several years.

The animals used have in all instances been sheep. The trials have covered a period of twelve or thirteen days, during the last five of which the fæces have been collected. These experiments have been especially free of mishaps, such as refusal to eat the entire ration, impaired health of the animals, or loss of dung from the collecting bags.

It is recognized, of course, that certain conditions operate to limit the accuracy and definiteness of digestion trials, such as individuality of animals, irregularity of excretion, the presence in the fæces of metabolic products which are not properly a part of the undigested food residues, and, in general, the present limitations of analytical methods, which do not admit of a satisfactory study of the digestibility of the various individual compounds of feeding stuffs. The first two conditions are overcome largely by averaging results simultaneously obtained with several animals, and it is hoped that future investigations will remove the difficulties caused by the existing lack of knowledge.

### DIGESTIBILITY OF CORN FODDERS.

The various materials coming from the corn plant which have been made the subject of digestion trials not heretofore reported are as follows:

CXLVII. Southern Corn Fodder. Whole plant. Crop of 1891. Cut when the corn was immature, the formation of ears not having

begun. Partially air-dried under cover, without showing any mould or decay.

CXLVI. Field Corn Fodder. Whole plant. Crop of 1891. Cut after the ears had become fully developed, the kernels being partially glazed. Partially air-dried under cover, without showing mould or decay.

CXLVIII. Sweet Corn Fodder. Whole plant. Crop of 1891. Cut after the ears had fully developed. Partially air-dried under cover, without showing mould or decay.

CLXX. Southern Corn Silage. Whole plant. Crop of 1892. Cut when immature, the formation of ears having merely begun on some stalks. Chopped and packed in silo. Silage good quality in appearance and flavor.

CLXXI. Field Corn Silage. Whole plant. Crop of 1892. Field No. 1. An abundant crop, heavily eared. Cut after ears had fully developed, the kernels being partially glazed. Chopped for silo. Silage very fine in appearance and flavor.

CLXXIII. Field Corn Silage. Whole plant. Crop of 1892. Field No. 2. A good crop well eared. Cut after the ears had fully developed, the kernels being partially glazed. Silage very fine in appearance and quality.

CCXXVII. Field Corn Fodder. Whole plant. Crop of 1893. Field No. I. Cut August 15th when formation of ears had only fairly begun. Chopped finely, spread very thinly on a scaffold and dried without any apparent fermentation.

CCXXXIII. Field Corn Fodder Whole plant. Crop of 1893. From same field as CCXXVII. Cut September 21st, after ears had fully developed and the the kernels were partially glazed. An abundant crop, heavily eared. Cut fine, spread very thinly on a scaffold and dried with no apparent fermentation.

The composition of the above named materials in the fresh and in the water-free condition is given on previous pages under the head of Analyses of Cattle Foods. Their composition at the time of using them in the digestion trials is stated below.

TABLE XVIII.

COMPOSITION OF FODDER MATERIALS AS FED IN DIGESTION EXPERIMENTS.

| | Water. | Ash. | Protein. | Fiber. | Nitrogen-free-extract. | Fat. |
|---|---|---|---|---|---|---|
| CXLVII Southern Corn fodder, partially air-dried | 50.50 | 3.61 | 6.06 | 15.87 | 22.94 | 1.02 |
| CXLVI Field Corn fodder, partially air-dried | 33.24 | 4.17 | 8.16 | 20.40 | 32.65 | 1.38 |
| CXLVIII Sweet Corn fodder, partially air-dried | 39.30 | 3.82 | 8.47 | 16.85 | 29.57 | 2.00 |
| CLXX Southern Corn silage | 86.50 | 1.11 | 1.69 | 4.03 | 6.30 | .37 |
| CLXXI Field Corn silage | 77.70 | 1.28 | 2.25 | 4.73 | 13.23 | .81 |
| CLXXIII Field Corn silage | 79.60 | .97 | 2.09 | 4.72 | 11.81 | .81 |
| CCXXVII Field Corn fodder, air-dry | 17.53 | 7.69 | 12.34 | 21.86 | 38.44 | 2.14 |
| CCXXXIII Field Corn fodder, air-dry | 18.93 | 5.79 | 8.55 | 17.34 | 47.08 | 2.31 |

The digestion coefficients of the fodders and silages previously described, as determined by actual trials, appear below. The data and necessary calculations can be found on subsequent pages.

TABLE XIX.

DIGESTION COEFFICIENTS OF CORN FODDERS AND CORN SILAGES.

| | Dry matter. | Organic matter. | Ash. | Protein. | Fiber. | Nitrogen-free-extract. | Fat. |
|---|---|---|---|---|---|---|---|
| CXLVII—Southern Corn fodder, 1891 | 61.3 | 62.8 | 43.1 | 63.4 | 65.7 | 61. | 59. |
| CXLVI—Field Corn fodder, 1891 | 72.7 | 74.2 | 50.7 | 67.6 | 78.6 | 73.8 | 64.7 |
| CXLVIII—Sweet Corn fodder, 1891 | 70.9 | 72.7 | 44. | 71.5 | 74.6 | 73.1 | 77. |
| CLXX—Southern Corn silage, 1892 | 64.4 | 65.8 | 48.2 | 64.8 | 66.7 | 65.4 | 67.8 |
| CLXXI—Field Corn silage, 1892 | 78. | 80.2 | 41.3 | 68. | 77.9 | 83.1 | 80.9 |
| CLXXIII—Field Corn silage, 1892 | 76. | 77.9 | 36.6 | 73.3 | 77.8 | 78.5 | 80.9 |
| CCXXVII—Field Corn fodder, 1893 | 69.8 | 71.4 | 54.5 | 70.4 | 72.3 | 71.3 | 67.3 |
| CCXXXIII—Field Corn Fodder, 1893 | 69.7 | 73.6 | 20. | 68.6 | 70.7 | 76.7 | 73.7 |

## THE DIGESTIBILITY OF CORN FODDER AND CORN SILAGE AS COMPARED WITH OTHER CATTLE FOODS.

During the past four years sixteen different samples of corn fodder and silage have been made the subject of thirty-seven digestion trials at the Maine Experiment Station. These trials have included three varieties of corn both as partially dried fodder and as silage, coming from four years crops excepting in the case of the sweet corn. Further repetition of this work ought not to be necessary in order to establish safe digestion co-efficients for use in Maine feeding practice. The averages of the entire number of trials are for each variety of corn as follows:

TABLE XX.

AVERAGE COEFFICIENTS OF DIGESTIBILITY AS FOUND AT THE MAINE EXPERIMENT STATION.

| | Dry matter. | Organic matter. | Ash. | Protein N×6.25. | Fiber. | Nitrogen-free extract. | Fat. |
|---|---|---|---|---|---|---|---|
| Southern Corn fodder, 3 samples, 6 trials | 65.2 | 66.8 | 45.1 | 62.3 | 71.5 | 65.0 | 66.2 |
| Southern Corn silage, 2 samples, 6 trials | 63.8 | 66.0 | 31.5 | 55.7 | 70.2 | 65.5 | 66.5 |
| Field Corn fodder, 4 samples, 9 trials | 70.8 | 73.1 | 41.9 | 65.4 | 76.2 | 73.3 | 70.0 |
| Field Corn silage, 3 samples, 8 trials | 74.3 | 76.7 | 30.0 | 64.7 | 76.9 | 78.3 | 81.4 |
| Sweet Corn fodder, 3 samples, 6 trials | 67.1 | 69.7 | 35.6 | 64.1 | 73.8 | 68.2 | 76.9 |
| Sweet Corn silage, 1 sample, 2 trials | 68.1 | 70.1 | 31.9 | 54.0 | 71.1 | 71.8 | 83.5 |
| Timothy hay (average 10 (Maine) samples) | 57.0 | 58.0 | 37.0 | 48.0 | 53.0 | 63.0 | 57.0 |
| Wheat bran, average 2 samples | 59.0 | 63.0 | – | 76.0 | – | 66.0 | 73.0 |
| Corn meal* | 87.0 | – | – | 60.0 | – | 92.0 | 92.0 |

* General average.

These figures show beyond question that corn fodder well preserved and corn silage have a high digestibility as compared with hay. To this fact should be attributed in large measure, undoubtedly, the great favor with which the corn plant, as now preserved in the silo, is regarded by dairymen as milk producing food. What has been supposed by many to be due to the peculiar influence of

the fermentations in the silo, should more properly be credited to the superior food properties of the plant which the silo conserves so efficiently, and which would be equally valuable when preserved as completely in any other manner.

### COMPARATIVE DIGESTIBILITY OF MAINE FIELD CORN AND THE LARGE SOUTHERN WHITE CORN.

There appears to be a marked difference in the digestibility of these two varieties of corn, which were grown under entirely similar conditions as to climate, location and manuring, the former being allowed to mature and the latter cut before silking. The following figures are sufficient evidence of this and show that the advantage is greatly with the smaller variety.

TABLE XXI.

COMPARATIVE DIGESTIBILITY OF TWO VARIETIES OF CORN.

| | Dry matter. | Organic matter. | Ash. | Protein. | Fiber. | Nitrogen-free-extract. | Fat. |
|---|---|---|---|---|---|---|---|
| Field Corn fodder and silage, 7 samples, 17 trials | 72.3 | 74.6 | 36.8 | 65.1 | 76.5 | 75.5 | 74.9 |
| Southern Corn fodder and silage, 5 samples, 12 trials | 64.6 | 66.5 | 39.7 | 59.6 | 71.0 | 65.2 | 66.3 |
| Difference in favor of the Field Corn | 7.7 | 8.1 | - | 5.5 | 5.5 | 10.3 | 8.6 |

The observations on which the above comparison is based are too numerous and too nearly a unit in the evidence which they furnish to allow a chance of doubting the significance of the figures. It is certainly a matter of some importance to Maine farmers that the smaller variety of corn, which matures in this latitude, should prove to be more digestible to the extent of about eight per cent of the total dry matter.

The nitrogen-free-extract appears to show a greater difference of digestibility than any other portion of the plant and it is here that we must look for at least a partial explanation of the fact under discussion.

Repeated reference has already been made to the much larger percentage of highly digestible carbohydrates in the mature Maine field corn as compared with the immature Southern corn. This

fact must certainly largely account for the superior digestibility of the former. Several examinations of the feces in these experiments have failed to show the presence of sugars or starch, the diastase test being employed for the latter. These carbohydrates being entirely soluble in the digestive fluids, as it was reasonable to expect, their presence in these foods in greatly varying quantities must certainly cause corresponding variations in the digestibility of the nitrogen-free-extract, and consequently of the total dry matter, other things being equal.

That this is so, is easily seen from the figures presented in Table XXII.

TABLE XXII.

DIGESTIBILITY OF NITROGEN-FREE EXTRACT.

| | Dry substance fed daily—grams. | In 100 parts dry substance. | | Starch and sugars digested daily—grams. | Nitrogen-free-extract, other than starch and sugars digested daily—grams. | Per cent starch and sugars digested. | Per cent nitrogen-free-extract digested, other than starch and sugars. | Per cent total nitrogen-free-extract digested. |
|---|---|---|---|---|---|---|---|---|
| | | Per cent starch and sugars. | Per cent total nitrogen-free-extract. | | | | | |
| SILAGE. | | | | | | | | |
| CLXX—Southern Corn silage.... | 337.5 | 3.70 | 46.64 | 12.5 | 90.4 | 100. | 62.4 | 65.4 |
| CLXXI—Field Corn silage ..... | 437.7 | 18.32 | 59.3 | 80.2 | 135.6 | 100. | 75.5 | 83.1 |
| CLXXIII—Field Corn silage..... | 408. | 17.43 | 57.9 | 71.1 | 114.5 | 100. | 69.3 | 78.5 |
| CORN FODDER. | | | | | | | | |
| CCXXVII—Field Corn, immature, Sheep 1..... | 701. | 11.70 | 46.6 | 82. | 155.6 | 100. | 63.6 | 72.7 |
| CCXXVII—Field Corn, immature, Sheep 3..... | 701. | 11.70 | 46.6 | 82. | 150.2 | 100. | 61.4 | 71.1 |
| CCXXVII—Field Corn, immature, Sheep 4..... | 701. | 11.70 | 46.6 | 82. | 147.7 | 100. | 60.4 | 70.3 |
| CCXXXIII—Field Corn, mature, Sheep 1 ..... | 689. | 31.87 | 63.3 | 219.6 | 92.2 | 100. | 51. | 77.9 |
| CCXXXIII—Field Corn, mature, Sheep 3 ..... | 689. | 31.87 | 63.3 | 219.6 | 80.7 | 100. | 44.7 | 75.5 |
| CCXXXIII—Field Corn, mature, Sheep 4 ..... | 689. | 31.87 | 63.3 | 219.6 | 88. | 100. | 48.7 | 76.7 |

## THE DIGESTIBILITY OF THE PENTOSE CARBOHYDRATES.*

W. E. STONE AND W. J. JONES.

†During the past five years attention has frequently been called to the occurrence, in many vegetable materials, of the pentosans, the term being applied to those carbohydrate-like bodies, which, upon hydrolysis produce the pentatomic sugars, arabinose or xylose, as the case may be. The presence of pentosans may be recognized by heating the materials with moderately concentrated hydrochloric or sulphuric acid, when furfurol is formed and may be detected in the vapors by the intense red color produced upon test paper freshly moistened with anilin acetate. This reaction is very sensitive and may be obtained, almost without exception, from all vegetable substances. So far as is at present known furfurol is, under these conditions, produced only from the pentose carbohydrates, with the exception of the rare glucuronic acid and its derivatives. The above mentioned test has therefore come to be regarded as a specific one, and its wide application seems to justify the statement that the pentosans are common constituents of vegetable substances. Upon closer examination it has also been found that many food materials contain the pentosans in very appreciable quantities, and it becomes desirable therefore to know something of their food value and digestibility. The ordinary food analysis, however, quite ignores these bodies except to classify them indiscriminately with all the other soluble non-nitrogenous compounds under the general term "nitrogen-free-extract matter." It is only within a short time, that any analytical method has existed which permits a separate estimation of these bodies. Such methods are now known in two or three modifications, any of which are capable of showing conclusively and with considerable accuracy, the presence of the pentosans under all conditions. It has therefore become possible to

*This article is extracted from Agricultural Science Vol. VII, No. 1, p. 6.

†These extracts are reprinted in this connection partly because of the importance of the results and partly to give added prominence and emphasis to investigation of this sort. Our knowledge of the constitution and properties of many food compounds is sadly deficient, and the most pressing need of to-day in the line of animal nutrition is work of the kind which Dr. Stone and his associates have done in studying the carbohydrate group. Investigations of this class will be potent in shaping future knowledge and will be quoted long after many of the so called practical experiments are buried in a heap of rubbish. W. H. J.

obtain some idea as to the digestibility of these bodies by including these methods among the analytical processes controlling an ordinary digestion experiment.

One of us has already published the results of a brief digestion experiment with rabbits, from which it appeared that in a normal ration about sixty per cent. of the pentosans were digested It was also noticed that the proportion of pentosans to the entire amount of nitrogen-free-extract was much increased in the fæces as compared with the food. These results, however, being based upon meagre data, had little more than a suggestive value, as showing the importance of further study in the same direction. The present paper adds a considerable amount of proof to the previous one without materially changing the conclusions then drawn.

Some months since, Professor W. H. Jordan, Director of the Maine Experiment Station, placed at our disposal a large number of control samples of the food and fæces from digestion experiments, carried on by him during a series of years. These samples had been carefully preserved in air-tight vessels and reached us in excellent condition. We have determined the pentosans in these samples and from the feeding data furnished us by Professor Jordan, we are enabled to report upon their digestibility in twenty different experiments. . . . . The errors . . . . . of the analytical methods and of the assumption upon which the calculations are based, are all such as to minimize the actual results. In the same direction, we have presented here the lowest results obtained from duplicate determinations in each case. The data, here given indicate, therefore, the minimum amounts of pentosans found, so that the results of future study and perfected methods will, we believe, emphasize rather than diminish the conclusions here drawn.

The materials used in the digestion experiments were in part, selected samples of single species of grasses grown for the purpose at the Maine Experiment Station, and the samples were typical of our forage grasses. It is of preliminary interest, therefore, to mark the extent to which the pentosans occur in these and other materials of common and frequent use as cattle foods.

The furfurol (i. e. pentosans) was determined in each sample in duplicate by separate distillations. The lowest of these results was then multiplied by the factor 1.38 to convert it into a value representing pentosans. For comparison, the percentages of nitrogen-free-extract matter as given in Professor Jordan's report, are repeated here. All numbers relate to the dry matter.

| | Per ct. furfural. | | Per cent pentosans (a×1.38). | Per cent N-free. extract. |
|---|---|---|---|---|
| | a. | b. | | |
| LXXXVI Phlemn pratense, in early bloom | 11.34 | 11.45 | 15.65 | 51.94 |
| LXXXVII Phlemn pratense, 10 days after bloom | 11.72 | 11.83 | 16.17 | 55.51 |
| CXIX Phlemn pratense, early cut | 9.79 | 9.85 | 12.59 | 46.50 |
| CXX Phlemn pratense, late cut | 10.34 | 10.91 | 14.26 | 51.11 |
| CXL Timothy hay; chiefly Phlemn pratense | 8.33 | 8.48 | 11.50 | 50.17 |
| CLXI Same; another selection | 8.88 | 8.94 | 12.25 | 50.16 |
| LXXXVIII Danthonia Spicata | 8.87 | 9.63 | 12.24 | 52.07 |
| LXXXIX Argrostis Vulgaris | 9.62 | 9.62 | 13.27 | 53.43 |
| XCVI Calamagrostis Canadensis, in bloom | 7.83 | 8.06 | 10.81 | 45.25 |
| XCVII Triticum repens | 8.39 | 8.72 | 11.58 | 52.94 |
| CXXVIII Hay of Hungarian grass | 9.93 | 10.23 | 13.70 | 47.52 |
| XC Trifolium hybridum | 6.41 | 7.90 | 8.85 | 44.39 |
| CXXV Field Corn fodder | 11.93 | 12.05 | 16.46 | 52.45 |
| LXXXIII Southern Corn fodder | 8.35 | 8.57 | 11.52 | 46.09 |
| CXXXIII Sugar beets | 7.48 | 8.16 | 10.32 | 77.31 |
| CXXX Rutabagas | 5.99 | 6.11 | 8.26 | 71.29 |
| CXXXIV Gluten meal | 4.46 | 4.70 | 6.15 | 52.60 |
| XCII Fancy middlings | 6.79 | 7.02 | 9.37 | 64.18 |
| XCI Wheat bran | 8.68 | 9.15 | 11.88 | 60.28 |
| CXXXV Wheat bran, another selection | 11.56 | 11.63 | 15.95 | 58.93 |

These results are quite confirmatory of those previously given, showing the presence of appreciable amounts of these bodies in all of these common food materials. The grasses make the largest showing, but in the majority of samples the pentosans amounted to from twenty to thirty per cent of the non-nitrogenous extractive matter.

Accompany the above samples were corresponding samples of the fæces of the animals employed in the digestion experiments, duplicated in each case. We have determined the amount of pentosans in each of these and from the gross weights of the food consumed and fæces excreted have calculated in the usual way the digestibility of the pentosans in question. These digestion experiments were conducted under the usual precautions and control, all of which, together with the analytical data, have been published

in Professor Jordan's reports. The animals experimented upon were sheep in each case. . . . . Summarizing the results of the preceding experiments, we have the following oversight of the twenty materials studied:

| | Per cent of pentosans digested. |
|---|---|
| LXXXVI Phleum pratense, early bloom | 60.4 |
| LXXXVII Phleum pratense, late cut | 62.8 |
| CXIX Phleum pratense, early bloom | 54 6 |
| CXX Phleum pratense, late cut | 48.2 |
| CXL Timothy hay (chiefly Phleum pratense) | 48.0 |
| CXLI Timothy hay (chiefly Phleum pratense | 49.5 |
| LXXXVIII Danthonia spicata | 68.6 |
| LXXXIX Agrostis vulgaris | 70.0 |
| XCVI Calamagrostis Canadensis | 90.4 |
| XCVII Triticum repens | 59.9 |
| CXXVIII Hungarian grass | 68.2 |
| XC Trifolium hybridum | 56.8 |
| CXXV Fodder of field corn | 76.6 |
| LXXXIII Fodder of Southern field corn | 69.6 |
| Timothy hay, CXL, and sugar beets | 71.3 |
| Timothy hay, CXL, rutabagas | 57.1 |
| Timothy hay, CXLI, and wheat bran | 45 6 |
| Timothy hay, CXLI, gluten meal | 59.1 |
| Hay of Agrostis vulgaris, LXXXIX, and wheat bran, | 54 1 |
| Hay of Agrostis vulgaris, LXXXIX, wheat middlings, | 64.9 |

The average of these various results, excluding the data for Calamagrostis Canadensis, which evidently present something anomalous, shows 58.2 per cent of pentosans to have been digested and 41.8 per cent undigested.

These results are worthy of consideration. Twenty of the best known food stuffs for cattle are here shown to contain a minimum of from 6-16 per cent of their dry weight in pentosans, of which an average of only 58.2 per cent is found to be digestible. It appears then, that while these bodies are to be for the present classified among the carbohydrates, they are really much less digestible, and hence of less food value, than the better known members of this group, such as starch, sugar, etc. In many cases the indicated digestibility is even less than that assigned to the fibre of the same

materials and the average of all the experiments is but little higher than the corresponding average for the fibre. Indeed from the data at hand it would appear that of all the food constituents capable of individual estimation, these are among the less soluble in the digestive fluids, although commonly included among those substances which are regarded as in a high degree digestible.

Not only do the pentosans seem to be of low digestibility, but according to Ebstein, the pentoses derived from them by hydrolysis (arabinose and xylose) are little, if at all assimilated, although readily soluble. He has lately shown that the pentose sugars even in very small quantities are not assimilated by the human organism. Xylose taken in doses of less than one dram by healthy persons, could be recognized in the urine after two or three hours, and hence the use of these sugars even by healthy and much more by diabetic persons could yield no beneficial results. In this connection it is of interest to remember that the pentoses are also non-fermentable. As regards their physiological behavior, they are evidently quite distinct from the hexoses, although otherwise resembling them in chemical characteristics. It is not surprising, therefore, that the less soluble mother substance the pentosans, should also prove less digestible than other carbohydrates. In the light of Ebstein's observations, there is, moreover, good reason for believing that even such portions of the pentosans as are dissolved in the digestive tract are, after all, not assimilated.

Chemical Laboratory, Purdue University, November, 1892.

## SUMMARY.

(1) A study of the digestibility of the whole corn plant shows it to have a high percentage digestibility as compared with hays and other coarse fodders, especially when allowed to develop to maturity. Of ten samples of Timothy hay, 57 per cent of the dry matter has proved to be digestible, while of Flint corn fodder (whole plant, mature) 71 per cent was digested.

(2) The mature Flint corn has proved to be more digestible than the immature Dent corn, the relation for all trials of fodder and silage being as 72 : 65.

(3) This large difference of digestibility of the two varieties of corn as harvested in Maine is undoubtedly due to the greater proportion of fiber in the Dent corn and to the larger relative amount of entirely digestible sugars and starch in mature Flint corn. This

is shown in part by the fact the excess of digestibility of the latter variety falls largely upon the nitrogen-free extract.

(4) Dr. Stone's investigations of samples of foods and fæces from digestion experiments conducted at this Station show that the pentosans (vegetable gums) were present in all the foods studied, and were digested from 45 per cent to 76 per cent. Dr. Stone observes that there is good reason for believing that even such portions of the pentosans as are dissolved in the digestive tract are, after all, not assimilated.

## DATA PERTAINING TO DIGESTION EXPERIMENTS.

TABLE XXII *a*.

COMPOSITION OF THE FECES.

| | In 100 parts of dry matter. | | | | |
|---|---|---|---|---|---|
| | Ash. | Protein, Nx6.25. | Fiber. | Nitrogen-free extract. | Fat. |
| CXLVII—Southern Corn fodder, Sheep 1 | 10.56 | 11.32 | 27.84 | 48.04 | 2.24 |
| Sheep 3 | 11.45 | 13.46 | 25.45 | 47.30 | 2.35 |
| CXLVI—Field Corn fodder, Sheep 1 | 11.38 | 14.69 | 23.43 | 47.34 | 3.14 |
| Sheep 3 | 11.16 | 15.89 | 22.01 | 48.41 | 2.53 |
| CXLVIII—Sweet Corn fodder, Sheep 2 | 11.98 | 14.06 | 23.70 | 47.34 | 2.92 |
| Sheep 4 | 11.54 | 14.27 | 23.02 | 48.55 | 2.62 |
| CLXX—Southern Corn silage, Sheep 1, 2, 3, 4 | 11.93 | 12.35 | 27.84 | 45.37 | 2.51 |
| CLXXI—Field Corn silage, Sheep 1, 2, 3, 4 | 15.33 | 14.67 | 21.30 | 45.53 | 3.17 |
| CLXXIII—Field Corn silage, Sheep 1, 3 | 12.48 | 11.34 | 21.40 | 51.62 | 3.16 |
| CLXXIV—Barley Hay, Sheep 1, 2, 3, 4 | 10.25 | 11.72 | 29.68 | 43.90 | 4.45 |
| CCXXXIII—Field Corn fodder, Sheep 1 | 18.55 | 12.80 | 21.77 | 44.60 | 2.28 |
| Sheep 3 | 19.43 | 12.92 | 20.56 | 44.46 | 2.63 |
| Sheep 4 | 18.62 | 14.15 | 19.84 | 44.88 | 2.51 |
| CCXXVII—Field Corn fodder, Sheep 1 | 13.15 | 14.32 | 24.91 | 44.91 | 2.71 |
| Sheep 3 | 15.45 | 14.87 | 23.82 | 42.78 | 3.08 |
| Sheep 4 | 13.57 | 14.65 | 24.21 | 44.83 | 2.74 |

## CALCULATIONS OF DIGESTION CO-EFFICIENTS.

### TABLE XXIII.

DIGESTIBILITY OF SOUTHERN CORN FODDER.

| SHEEP 1. | Dry substance. | Organic matter. | Ash. | Protein. | Fiber. | Nitrogen-free extract. | Fats. |
|---|---|---|---|---|---|---|---|
| Southern Corn fodder, CXLVII. | | | | | | | |
| 1,500 grams air-dry fodder daily..... | 739.5 | 685.1 | 54.05 | 90.57 | 237.0 | 342.6 | 15.2 |
| Not eaten..... | 139.5 | 131.4 | 8.3 | 10.80 | 61.8 | 56.7 | 2.0 |
| Amount eaten daily ..... | 600.0 | 553.7 | 45.7 | 79.77 | 175.2 | 285.9 | 13.2 |
| Excreted in fæces daily..... | 231.8 | 207.2 | 24.5 | 26.2 | 64.5 | 111.3 | 5.2 |
| | 368.2 | 346.5 | 21.2 | 53.57 | 110.7 | 174.6 | 8.0 |
| Digested, per cent ..... | 61.2 | 62.6 | 46.2 | 67.2 | 63.2 | 61.1 | 60.6 |
| SHEEP 3. | | | | | | | |
| 1,500 grams air-dry fodder fed daily. | 739.5 | 685.1 | 54.0 | 90.6 | 237.0 | 342.6 | 15.2 |
| Not eaten ..... ..... | 65.9 | 61.6 | 4.3 | 4.8 | 28.6 | 27.4 | .8 |
| Amount eaten daily ..... | 673.6 | 623.5 | 49.7 | 85.8 | 208.4 | 315.2 | 14.4 |
| Excreted in fæces daily..... | 259.8 | 230.0 | 29.7 | 34.6 | 66.2 | 122.9 | 6.1 |
| Digested..... | 413.8 | 393.5 | 20.0 | 51.2 | 142.2 | 192.3 | 8.3 |
| Digested, per cent.. ..... | 61.4 | 63.1 | 40.2 | 59.7 | 68.2 | 61.0 | 57.7 |
| Average .... ..... | 61.3 | 62.8 | 43.1 | 63.4 | 65.7 | 61.0 | 59.0 |

TABLE XXIV.

DIGESTIBILITY OF FIELD CORN FODDER.

| SHEEP 1. | Dry substance. | Organic matter. | Ash. | Protein. | Fiber. | Nitrogen-free extractive matter. | Fat. |
|---|---|---|---|---|---|---|---|
| Field Corn Fodder, CXLVI. | | | | | | | |
| 1,500 grams air-dry fodder daily .... | 1,003.5 | 940.4 | 62.6 | 122.6 | 306.6 | 491.0 | 20.3 |
| Not eaten ..... ..... | 153.3 | 143.8 | 9.7 | 12.5 | 60.5 | 68.3 | 2.3 |
| Amount eaten daily ..... | 850.2 | 796.6 | 52.9 | 110.1 | 246.1 | 422.7 | 18.0 |
| Excreted in feces daily .. ..... | 232.8 | 206.2 | 26.5 | 34.2 | 54.6 | 110.2 | 7.3 |
| Digested ..... .... | 617.4 | 590.4 | 26.4 | 75.9 | 191.5 | 312.5 | 10.7 |
| Digested, per cent ..... | 72.6 | 74.1 | 50.0 | 68.9 | 77.8 | 73.9 | 59.4 |
| SHEEP 3. | | | | | | | |
| 1,500 grams air-dry fodder fed daily. | 1,003.5 | 940.4 | 62.6 | 122.6 | 306.6 | 491.0 | 20.3 |
| Not eaten..... . ..... ..... | 160.1 | 149.5 | 10.5 | 14.8 | 61.1 | 71.3 | 2.4 |
| Amount eaten daily ..... | 843.4 | 790.9 | 52.1 | 107.8 | 245.5 | 419.7 | 17.9 |
| Excreted in feces daily..... | 228.2 | 202.8 | 25.3 | 36.2 | 50.3 | 110.5 | 5.8 |
| Digested. .... ..... | 615.2 | 588.1 | 26.8 | 71.6 | 195.2 | 309.2 | 12.1 |
| Digested, per cent ..... | 72.9 | 74.3 | 51.4 | 66.4 | 79.5 | 73.7 | 70.0 |
| Average ..... ..... | 72.7 | 74.2 | 50.7 | 67.6 | 78.6 | 73.8 | 64.7 |

TABLE XXV.

DIGESTIBILITY OF SWEET CORN FODDER.

| SHEEP 2. | Dry substance. | Organic matter. | Ash. | Protein. | Fiber. | Nitrogen-free extract. | Fat. |
|---|---|---|---|---|---|---|---|
| Sweet Corn Fodder, CXLVIII. | | | | | | | |
| 1,500 grams air-dry fodder daily ..... | 907.5 | 850.2 | 57.1 | 126.7 | 251.7 | 442.1 | 29.8 |
| Not eaten ..... | 111.1 | 101.9 | 9.2 | 9.6 | 42.4 | 48.4 | 1.6 |
| Amount eaten daily..... | 796.4 | 748.3 | 47.9 | 117.1 | 209.3 | 393.7 | 28.2 |
| Excreted in feces daily ..... ..... | 248.0 | 218.2 | 29.7 | 34.9 | 58.8 | 107.1 | 7.2 |
| Digested ..... | 548.4 | 530.1 | 18.2 | 82.2 | 150.5 | 186.6 | 21.0 |
| Digested, per cent..... | 68.8 | 70.8 | 38.0 | 70.2 | 71.9 | 72.8 | 74.5 |
| SHEEP 4. | | | | | | | |
| 1,500 grams air-dry fodder daily ..... | 907.5 | 850.2 | 57.1 | 126.7 | 251.7 | 442.1 | 29.8 |
| Not eaten ..... | 46.3 | 42.1 | 4.1 | 4.6 | 18.2 | 18.9 | .6 |
| Amount eaten daily ..... ... | 861.2 | 808.1 | 53.0 | 122.1 | 233.5 | 423.2 | 29.2 |
| Excreted in feces daily ..... . | 231.8 | 205.0 | 26.8 | 33.1 | 53.3 | 112.5 | 6.0 |
| Digested ..... | 629.4 | 603.1 | 26.2 | 89.0 | 180.2 | 310.7 | 23.2 |
| Digested, per cent ..... ..... | 73.1 | 74.6 | 50.0 | 72.8 | 77.3 | 73.4 | 79.6 |
| Average ..... | 70.9 | 72.7 | 44.0 | 71.5 | 74.6 | 73.1 | 77.0 |

TABLE XXVI.

DIGESTIBILITY OF SOUTHERN CORN SILAGE.

| | Dry matter. | Organic matter. | Ash. | Protein. | Fiber. | Nitrogen-free extract. | Fat. |
|---|---|---|---|---|---|---|---|
| Southern Corn Silage, CLXX. | | | | | | | |
| 2,500 grams silage daily | 337.5 | 309.7 | 27.7 | 42.2 | 100.7 | 157.4 | 9.4 |
| Excreted daily | 120.3 | 105.9 | 14.3 | 14.8 | 33.5 | 54.5 | 3.0 |
| Amount digested | 217.2 | 203.8 | 13.4 | 274.0 | 67.2 | 102.9 | 6.4 |
| Per cent digested | 64.4 | 65.8 | 48.2 | 64.8 | 66.7 | 65.4 | 67.8 |

DIGESTIBILITY OF FIELD CORN SILAGE.

| | Dry matter. | Organic matter. | Ash. | Protein. | Fiber. | Nitrogen-free extract. | Fat. |
|---|---|---|---|---|---|---|---|
| Field Corn Silage, CLXXI. | | | | | | | |
| 19,630 grams silage daily | 437.7 | 412.6 | 25.1 | 44.2 | 92.8 | 259.6 | 15.9 |
| Excreted daily | 96.2 | 81.4 | 14.7 | 14.1 | 20.5 | 43.8 | 3.0 |
| Amount digested | 341.5 | 331.2 | 10.4 | 30.1 | 72.3 | 215.8 | 12.9 |
| Per cent digested | 78.0 | 80.2 | 41.3 | 68.1 | 77.9 | 83.1 | 80.9 |

TABLE XXVII.

DIGESTIBILITY OF FIELD CORN SILAGE.

| | Dry matter. | Organic matter. | Ash. | Protein. | Fiber. | Nitrogen-free extract. | Fat. |
|---|---|---|---|---|---|---|---|
| Field Corn Silage, CLXXIII. | | | | | | | |
| 2,000 grams fed daily | 408.0 | 388.7 | 19.3 | 41.7 | 94.4 | 236.3 | 16.3 |
| Excreted daily | 98.2 | 85.9 | 12.3 | 11.1 | 21.0 | 50.7 | 3.1 |
| Digested | 309.8 | 302.8 | 7.0 | 30.6 | 73.4 | 185.6 | 13.2 |
| Per cent, digested | 76.0 | 77.9 | 36.6 | 73.3 | 77.8 | 78.5 | 80.9 |

DIGESTIBILITY OF BARLEY HAY.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Barley Hay, CLXXIV. | | | | | | | |
| 675 grams fed daily | 576.2 | 534.7 | 41.5 | 77.1 | 173.7 | 267.1 | 16.6 |
| Not eaten | 19.0 | 17.8 | 1.2 | 2.4 | 5.7 | 9.2 | .4 |
| Consumed daily | 557.2 | 516.9 | 40.3 | 74.7 | 168.0 | 257.9 | 16.2 |
| Excreted daily | 216.7 | 194.5 | 22.2 | 25.4 | 64.3 | 95.1 | 9.6 |
| Digested | 340.5 | 322.4 | 18.1 | 49.3 | 103.7 | 162.8 | 6.6 |
| Per cent, digested | 59.1 | 62.3 | 44.8 | 65.2 | 61.7 | 63.3 | 40.5 |

TABLE XXVIII.

DIGESTIBILITY OF FIELD CORN FODDER (MATURE).

| SHEEP 1. | Dry matter. | Organic matter. | Ash. | Protein. | Fiber. | Nitrogen-free extract. | Fat. |
|---|---|---|---|---|---|---|---|
| Field Corn Fodder, CCXXXIII. | | | | | | | |
| 850 grams fed daily | 689.0 | 639.8 | 49.2 | 72.7 | 147.4 | 400.2 | 19.6 |
| Excreted daily | 198.3 | 161.5 | 36.8 | 25.4 | 43.2 | 88.4 | 4.5 |
| Digested | 490.7 | 478.3 | 12.4 | 47.3 | 104.2 | 311.8 | 15.1 |
| Per cent digested | 71.2 | 74.8 | 25.2 | 65.1 | 70.7 | 77.9 | 77.0 |
| SHEEP 3. | | | | | | | |
| 850 grams fed daily | 689.0 | 639.8 | 49.2 | 72.7 | 147.4 | 400.2 | 19.6 |
| Excreted daily | 220.0 | 177.4 | 42.8 | 28.4 | 45.3 | 99.9 | 5.8 |
| Digested | 468.8 | 462.4 | 6.4 | 44.3 | 102.1 | 300.3 | 13.8 |
| Per cent digested | 68.1 | 72.3 | 13.0 | 60.9 | 69.3 | 75.5 | 70.5 |
| SHEEP 4. | | | | | | | |
| 850 grams fed daily | 689.0 | 639.8 | 49.2 | 72.7 | 147.4 | 400.2 | 19.6 |
| Excreted daily | 206.5 | 168.0 | 38.4 | 29.2 | 40.9 | 92.6 | 5.2 |
| Digested | 482.5 | 471.8 | 10.8 | 43.5 | 106.5 | 307.6 | 14.4 |
| Per cent digested | 70.0 | 73.8 | 21.9 | 59.8 | 72.2 | 76.9 | 73.6 |
| Average | 69.7 | 73.6 | 20.0 | 68.6 | 70.7 | 76.7 | 73.7 |

TABLE XXIX.

DIGESTIBILITY OF FIELD CORN FODDER (IMMATURE).

| SHEEP 1. | Dry matter. | Organic matter. | Ash. | Protein. | Fiber. | Nitrogen-free extract. | Fat. |
|---|---|---|---|---|---|---|---|
| Field Corn Fodder, CCXXVII. | | | | | | | |
| 850 grams fed daily | 701.0 | 635.6 | 65.4 | 104.9 | 185.8 | 326.6 | 18.3 |
| Excreted daily | 198.0 | 172.0 | 26.0 | 28.3 | 49.3 | 89.0 | 5.3 |
| Digested | 503.0 | 463.6 | 39.4 | 76.6 | 136.5 | 237.6 | 13.0 |
| Per cent digested | 71.7 | 72.9 | 60.2 | 72.9 | 73.4 | 72.7 | 70.6 |
| SHEEP 3. | | | | | | | |
| 850 grams fed daily | 701.0 | 635.6 | 65.4 | 104.9 | 185.8 | 326.6 | 18.3 |
| Excreted daily | 220.6 | 186.6 | 34.1 | 32.8 | 52.5 | 94.4 | 6.8 |
| Digested | 480.4 | 449.0 | 31.3 | 72.1 | 133.3 | 232.2 | 11.5 |
| Per cent digested | 68.6 | 70.7 | 48.1 | 68.7 | 71.7 | 71.1 | 62.9 |
| SHEEP 4. | | | | | | | |
| 850 grams fed daily | 701.0 | 635.6 | 65.4 | 104.9 | 185.8 | 326.6 | 18.3 |
| Excreted daily | 216.0 | 186.8 | 29.3 | 31.6 | 52.3 | 96.9 | 5.7 |
| Digested | 485.0 | 448.8 | 36.1 | 73.3 | 133.5 | 229.7 | 12.6 |
| Per cent digested | 69.2 | 70.6 | 55.2 | 69.8 | 71.8 | 70.3 | 68.4 |
| Average per cent digested | 69.8 | 71.4 | 54.5 | 70.4 | 72.3 | 71.3 | 67.3 |

# CORN AS A SILAGE CROP.

W. H. JORDAN.

The report of the Station for 1891, pp. 41-46 gives a summary of three years work in testing the relative production of food material by various fodder and root crops. It appeared that the large variety of corn known as Southern White produced the greatest amount of digestible dry substance per acre, excelling root crops, Hungarian grass and other varieties of corn. Since 1891 a comparison between varieties of corn has been continued. This has been done because this crop is an important one to Maine dairymen and because the problems connected with its growth in Maine are local in their nature and cannot be solved by experiments in other states, excepting possibly, New Hampshire and Vermont.

The most common question asked in this connection is, Which are the most profitable varieties to grow, the large, which mature only in a latitude south of New England or the smaller which complete their growth in this climate?

As set forth in the report previously mentioned, the proper test of productiveness is the yield of digestible dry matter, the gross weight of crop or even of total dry matter being deceptive because of differences on the water content and in the digestibility. All effort has been directed, then, towards ascertaining the actual growth of digestible material in the several cases. One other point has necessarily been considered, viz: the relative value of a pound of digestible material in the crops compared. This latter comparison can most safely be made by a feeding experiment and this has been the method used. The study of the corn crop has been conducted in 1892 and 1893 in much the same manner as in previous years only somewhat more comprehensively.

The data recorded in succeeding pages have been obtained,

(1) By weighing the green crop as harvested.

(2) By immediate drying of the green product to ascertain the dry matter.

(3) By analysis of the dry matter to determine its composition.

(4) By a partial chemical study of the nitrogen-free-extract.

(5) Digestion experiments with sheep.

All this work centers around two problems: First, the relative yield of digestible dry matter in immature Southern Dent corn and in mature Maine field corn; and second, the influence of maturity on the amount and kind of product.

*Weight of Green Product.* This was ascertained by cutting the whole field, and hauling to the barn and weighing as fast as cut.

*Determination of Dry Matter.* Several hundred pounds carefully selected from the several rows of each plot were cut by the horse power fodder cutter, thoroughly mixed, from which a large sample was taken for drying in a steam closet.

*Chemical Analysis.* These results have been described in previous pages. The ordinary analysis was by the methods of the A. O. A. C.

*Digestion Experiments.* These trials have been carried on either with the partially dried fodder or with the silage made from it. The detailed results of these experiments have been previously given.

*Manuring and Method of Planting.* 1892. Field No. 1. Size one acre, soil, a loam, somewhat lighter than clayey loam, shading towards sandy. Summer fallowed in 1891 to kill witch grass. About six cords of stable manure and a fertilizer consisting of four hundred pounds dissolved bone black, one hundred pounds muriate of potash, and seventy-five pounds nitrate of soda, applied in spring. Planted in rows three and one-half feet apart, with kernels six inches apart in drills. Level, clean culture. Planted May 19th, harvested September 6th to 9th.

Field No. 2. Size, one acre, soil, clayey loam. Planted to corn in 1891. About seven cords of stable manure and the same amount and kind of fertilizer as on Field No. 1, applied in spring. Culture and planting same as Field No. 1. Planted May 19th, harvested September 6th-9th.

1893. Field No. 1, same as in 1892. About six cords of stable manure and five hundred pounds of Bay State fertilizer, applied in spring. Planting and culture as 1892. Planted May 31st, harvested September 14th to 16th.

Field No. 2, same as in 1892. Manuring, planting and culture same as Field No. 1. Planted May 31st, harvested September 14th to 16th.

In both fields, during both years, each acre was divided into twenty plots, the two kinds of corn alternating, ten plots being devoted to each. It is scarcely possible to secure conditions more uniform in which to compare the growth of two crops than existed in these experiments.

The results secured are concisely stated in Table XXX, all intermediate data such as size of plots and yield per plot, being omitted.

The figures for the three years previous are stated for the sake of comparison.

## TABLE XXX.

COMPARATIVE YIELD OF SOUTHERN CORN AND MAINE FIELD CORN, AS GROWN IN MAINE—YIELD PER ACRE.

| | Green corn, (whole plant)—pounds. | Dry substance. | | Digestible dry substance. | |
|---|---|---|---|---|---|
| | | Per cent. | Pounds. | Per cent. | Pounds. |
| Crop of 1888. | | | | | |
| Southern Corn | 26,295 | 12.30 | 3,234.3 | 65 | 2,102.3 |
| Maine Field Corn | 14,212 | 17.4 | 2,472.9 | 70 | 1,720.5 |
| Crop of 1890. | | | | | |
| Southern Corn | 32,950 | 14.94 | 4,922.7 | 69 | 3,396.7 |
| Maine Field Corn | 15,300 | 15.84 | 2,415.9 | 71 | 1,715.3 |
| Crop of 1891. | | | | | |
| Southern Corn | 46,340 | 13.46 | 6,237.4 | 61 | 3,804.8 |
| Maine Field Corn | 28,080 | 13.55 | 3,804.8 | 73 | 2,777.5 |
| Crop of 1892. | | | | | |
| Southern Corn, Field 1 | 37,320 | 14.67 | 5,474.8 | 64 | 3,503.9 |
| Field 2 | 34,820 | 14.15 | 4,927.0 | 64 | 3,153.2 |
| Maine Field Corn, Field 1 | 22,490 | 20.90 | 4,700.0 | 78 | 3,666.0 |
| Field 2 | 29,400 | 18.64 | 5,480.0 | 76 | 4,164.8 |
| Crop of 1893. | | | | | |
| Southern Corn, Field 1 | 39,066 | 15.45 | 6,036.7 | * 65 | 3,923.2 |
| Field 2 | 26,660 | 16.58 | 4,420.2 | * 65 | 2,873.1 |
| Maine Field Corn, Field 1 | 27,780 | 25.43 | 7,064.4 | 70 | 4,945.0 |
| Field 2 | 18,610 | 19.50 | 3,628.9 | 70 | 2,540.2 |
| Southern Corn, 7 trials. | | | | | |
| Maximum | 46,340 | 16.58 | 6,237.4 | 69 | 3,923.2 |
| Minimum | 26,295 | 12.30 | 3,234.3 | 61 | 2,102.3 |
| Average | 34,761 | 14.50 | 5,036.0 | 65 | 3,251.0 |
| Maine Field Corn, 7 trials. | | | | | |
| Maximum | 29,400 | 25.43 | 7,064.4 | 78 | 4,945.0 |
| Minimum | 14,212 | 13.55 | 2,415.2 | 70 | 1,715.3 |
| Average | 22,269 | 18.75 | 4,224.0 | 73 | 3,076.0 |

* The average of previous years.

The foregoing figures show a large variation in production in different years, under conditions other than the season, quite uniform. This variation is not alone in gross weight of crop, but in dry matter as well The largest quantity of dry matter produced in any case during five years is nearly three times that yielded by the smallest crop. This is due in part to the manuring and cultivation and in part to the character of the season.

Had these experiments been discontinued after 1891 the outcome would have been decidedly favorable to the large variety of Dent corn. but in 1892 and 1893, the relation of yield has been reversed and the smaller variety of Flint corn has taken the lead. It is probable that another five years' series of comparisons would furnish a somewhat similar experience.

The general outcome for the five years is slightly favorable to the large variety of corn if we consider only the yield of digestible dry matter. But when we take account of the fact that in the one case an average of five and one-half tons more of material have annually been handled over several times, we are led to conclude that the smaller, less watery variety of corn has really proved the more profitable.

It is significant, also, that the largest yield of dry matter in any instance has been from the smaller variety. While the Flint corn grown in this State is not capable of producing so much dry substance as the large variety of Dent corn, under circumstances equally favorable for both, the former cannot in this latitude reach anything like maturity, and so loses the advantage of that period when growth is most rapid, as subsequent figures show.

The writer has made one or two observations during these five years which may be worth noting. One is that the cut worm scarcely ever molests the large Dent corn, even when feeding freely on the smaller Flint variety. This fact was observed during two years. It is also the writer's opinion, from observation, that conditions unfavorable as to fertility and cultivation will reduce the growth of the Maine corn to the greater extent.

A condensed summary of the results which are the outcome of this series of experiments, appears below. These statements stand somewhat in conflict with those of the 1891 report. It must be remembered, however, that the honest experimenter is limited in his conclusions to the facts which appear after a careful analysis of data. Facts should always outweigh existing opinions. Such a

rule of action often requires a reversal of former conclusions. This experience may be unfortunate but is not blameworthy.

(1) The average weight per acre of the green crops for five years were: Southern corn, 34,761 pounds; Maine field corn, 22,269 pounds; difference, 11,492 pounds, or nearly five and three-fourths tons.

(2) The average dry matter per hundred pounds was nearly one-third more in the Maine field corn, the relation being: Southern corn 14.50 pounds; Maine field corn 18.75 pounds, or as 100:129.

(3) The Maine field corn proved to be more digestible, the relation for dry matter being: Southern corn, 65; Maine corn, 73, or as 100:112.

(4) The average pounds of digestible dry matter per hundred pounds of green corn have been: Southern corn 7.25 pounds; Maine field corn 13.69 pounds, or as 100:189.

(5) The average yield of dry matter per acre has been: Southern corn 5,036 pounds,—extremes, 7,064 pounds and 2,415 pounds.

(6) The average yield of *digestible* dry matter has been: Southern corn 3,251 pounds,—extremes 3,923 pounds and 2,102 pounds; Maine field corn 3,076 pounds,—extremes 4,945 pounds and 1,715 pounds.

(7) The yield of digestible dry matter has averaged 175 pounds more per acre with the Southern corn. To offset this it has been necessary to handle annually five and three-fourths tons more weight.

(8) The largest as well as the smallest yield of digestible dry matter in a single year has been furnished by the Maine field corn.

## THE INFLUENCE OF MATURITY UPON THE VALUE OF THE CORN CROP FOR FODDER OR SILAGE PURPOSES.

There have existed, without doubt, some very erroneous notions in regard to the relative value of the corn crop at different stages of growth. Corn that is thickly planted and cut when quite immature is so easily masticated and is eaten with such evident relish, that such material has by many been regarded more highly than the facts warrant. Correct views prevail to a greater extent than formerly, partly because several careful experiments, the results of which have been widely published, show that the plant continues to increase its store of dry substance until full maturity and that this growth is very rapid during the last stages of development.

It was understood, therefore, that an experiment along this line would be to an extent a repetition. Nevertheless for several reasons it was thought best to do this. In the first place an unusually good opportunity was offered to secure uniform conditions as to soil. Again, the outcome whatever it might be would be a more valuable object lesson to Maine farmers than results reached in some other state. Finally, it was desired to learn something as to the nature of the growth which is so rapid at approaching maturity.

The field of corn selected for studying the influence of maturity was the one designated as Field No. 1 (1893). The corn was of very uniform growth, being finely eared and in every way satisfactory for experimental purposes.

Each of the ten plots consisted of five rows, and it was decided to harvest one fifth of the crop or one-tenth of an acre at each of five periods of growth. cutting one row of each plot at each period. As in other similar experiments, quite an amount of each lot was finely chopped, and a portion of this was immediately dried in a steam closet.

TABLE XXXI.

PRODUCTION OF THE CORN PLANT AT DIFFERENT STAGES OF GROWTH.

| Date of cutting and condition of crop. | Days in each period of growth. | Yield of green corn per acre. | Dry substance. | | Gain in weight in e'ch period, dry matter—lbs. | Rate of gain per day—dry matter—lbs. |
|---|---|---|---|---|---|---|
| | | | Per cent in crop. | Total yield per acre—lbs. | | |
| August 15th, ears beginning to form | | 26,166 | 11.71 | 3,064.0 | | |
| August 28th, a few roasting ears .... | 13 | 29,777 | 17.50 | 5,210.9 | 2,146.9 | 165.0 |
| Sept. 4th, all roasting ears..... | 7 | 31,000 | 19.55 | 6,060.5 | 849.6 | 121.3 |
| Sept. 12th, some ears glazing..... | 8 | 28,833 | 23.17 | 6,680.6 | 620.1 | 77.5 |
| Sept. 21st, All ears glazed..... | 9 | 27,777 | 25.34 | 7,039.7 | 358.1 | 39.8 |
| Total increase after August 15th | - | - | - | - | 3,974.7 | |

The results of this experiment certainly furnish a striking illustration of the folly of harvesting immature corn for silage purposes whenever it is possible to allow it to attain maturity.

In this instance, the quantity of dry matter in the corn at maturity was nearly two and one-half times greater than at the silking period thirty-seven days previous, the average rate of increase per acre of dry substance being about 108 pounds daily. This daily increase is equivalent in quantity to one day's ration for four or five cows of ordinary weight.

The character of this growth has been clearly set forth on previous pages, in discussing the analyses of these samples of corn fodder. The facts that appear can be emphasized, however, by a display of the quantities of the different classes of nutrients found to exist at the different periods of growth.

The figures in Table XXXII are the results of applying the foregoing analyses to the total yield of dry matter

TABLE XXXII.

PRODUCTION OF DIFFERENT CLASSES OF COMPOUNDS BY THE CORN PLANT AT DIFFERENT STAGES OF GROWTH.

| | Ash. | Protein, N×6.25. | Fiber. | Nitrogen-free-extract. | Sugars. | Starch. | Fat. |
|---|---|---|---|---|---|---|---|
| August 15th, ears beginning to form* | 285.9 | 458.4 | 812.3 | 1,428 | 358.5 | – | 79.7 |
| August 28th, a few roasting ears .... | 338.7 | 611.7 | 1,214.0 | 2,892 | 1,064.0 | 108 | 153.7 |
| September 4th, all roasting stage.... | 376.3 | 689.6 | 1,192.0 | 3,621 | 1,248.0 | 297 | 181.8 |
| September 12th, some ears glazing.. | 372.4 | 639.5 | 1,291.0 | 4,177 | 1,407.0 | 357 | 200.4 |
| September 21st, all ears glazed..... | 416.1 | 649.8 | 1,369.0 | 4,457 | 1,161.0 | 1,083 | 208.4 |
| Gain after August 15th..... | 130.2 | 191.4 | 496.7 | 3,029 | 802.5 | 1,083 | 128.7 |
| Gain after August 28th ..... | 77.4 | 38.1 | 95.0 | 1,565 | 97.0 | 975 | 54.7 |

*The manner of drying the sample taken from the lot cut at this period may have caused a loss of sugar.

From August 15th to August 28th there appears to have been considerable growth of the compounds of all classes, but after that date the increase of dry matter was due chiefly to the formation of one class of compounds. After August 28th, and until September 21st, the total growth was 1,828 pounds of dry matter, 1,565 pounds of which, or all but 263 pounds, belonged to the nitrogen-free-extract. Of this 1,565 pounds, 1,072 pounds consisted of sugars and starch. Two facts are clearly shown: First, that the later growth of dry matter in the corn plant is made up chiefly of non-nitrogenous compounds; and second, a large percentage of these compounds consisted of sugars and starch, substances that are the best of their class for the purposes of animal nutrition.

# Feeding Experiments.

W H. JORDAN.

There are two methods of judging the value of cattle foods. In common parlance one would be styled "scientific" and the other "practical." Both may be correctly classed as scientific or as practical according to the manner in which they are carried out and the standpoint from which they are regarded. Certainly if a conclusion is reached through truly scientific means it must have an entirely practical application, and no conclusion can be safely applied to the management of a business, which has not been reached in a way that is essentially scientific.

The two methods by which we may study a cattle food in trying to estimate its value, are: First, determine its composition and digestibility and then from known principles and the facts determined derive an opinion as to the place this food will take in stock feeding; and second, to feed this food to a given class of animals, under conditions as definite and as well controlled as possible, note the apparent results, and base a conclusion upon these. The conclusions should be the same by both methods provided that on the one hand it is possible to find out not only the amounts but the nutritive office of all the compounds which the food contains, and that on the other hand, perfect control and knowledge of every factor involved in a feeding experiment can be secured. In neither case are we now able to realize a satisfactory standard of work, and so in comparing the two methods it is only a question of which one can be so carried out as to be entitled to the greater degree of confidence.

Of course the ultimate appeal must in a general way always be to the animal, and the strongest conclusions are those supported both by theoretical considerations and actual results.

A question may arise, however, where from the standpoint of the chemist a clear answer is given, which answer is not ratified by the results of a feeding experiment, as to which is at present the more reliable basis of judgment, the knowledge gained by a chemical study of the food, or the apparent outcome of an actual feeding trial. For instance, it is desired to compare the feeding value of

bran and fine middlings. The composition of the two is found not to differ greatly so far as it is a question of the relative amounts of the several classes of compounds, and the digestibility of the former is found to be much less than that of the latter. These facts regarded in the light of approved theories, warrant the conclusion that the feeding value of the middlings is the greater. But a feeding trial in which rations, containing in some periods bran and in others, middlings, are compared, either does not show the expected difference, or declares one altogether larger than other facts seem to warrant. Are we, then, to conclude the theory is wrong? Certainly not from a single trial. So many conditions, such as the lengthening of the period of lactation, the temperature of the barn, variations in weight due to a change in intestinal contents, and the unreckoned or unmeasured increase or decrease of the flesh of the animal (if with cows), enter into a feeding trial as unknown factors, that such differences as exist between two grain foods may either be covered up or greatly exaggerated. Nothing short of several feeding trials should be allowed to throw a doubt upon the correctness of theories that appear to be well substantiated by severe methods of investigation, and even then the points of disagreement would, doubtless, be regarded as unsettled questions.

Fortunately, however, the value to farm practice of the feeding trials here reported is not lessened by apparent discrepancies between the outcome which general principles would seem to dictate and the results actually reached. The experiments which are discussed in this connection are the following:

(1) The relative feeding value of Southern corn silage and Maine field corn silage.

(2) The influence of widely differing rations upon the quantity and composition of milk.

(3) Experiments with swine.

(*a*) Relative economy of production with different breeds.

(*b*) The market value of different breeds.

(*c*) The comparative value of nutrients from skimmed milk and from vegetable foods.

(*d*) The economy of production at different ages.

## FEEDING EXPERIMENTS WITH COWS.

### THE RELATIVE FEEDING VALUE OF SOUTHERN CORN SILAGE AND MAINE FIELD CORN SILAGE.

The discussion on previous pages of the comparative composition and digestibility of Southern corn and Maine field corn, makes plain three facts:

1st. The Maine Corn contains less water or more dry matter than the other.

2nd. The dry matter of the Maine Field Corn is the more digestible of the two kinds.

3rd. This difference is due to the formation in the Maine Field Corn, while maturing, of compounds that are wholly digestible and of the highest nutritive value.

These facts as plainly declare as facts can that the one variety of corn is worth much more than the other in feeding value, if equal weights are compared. Can this be shown in practice? Will the animal ratify the conclusion that the digestible dry matter, when judging foods of the same class, is a safe standard of comparison?

What is the influence of maturity on the value of the digestible dry matter as shown by experience?

These questions as related to silage corn were submitted to the test of a feeding experiment for milk production in the winter of 1892-3. The plan of the experiment was a simple one. It was divided into three periods, of about one month each, the only essential changes in the rations of the several periods being a substitution of one kind of silage for the other. It was intended to supply the same quantity of digestible material from each of the two kinds of silage. This was not done, however, because it was not possible to ascertain the actual composition and digestibility of these materials until during the time they were being fed, and more digestible dry substance was consumed in the Maine Field Corn Silage than in the other. The data noted in this experiment include:

(1) The weights of food consumed.

(2) The composition and digestibility of the foods.

(3) The weights of water drank.

(4) Variation of the live weights of the cows. (The cows were weighed on three successive days of each week.)

(5) The yield of milk. (Each mess of milk was weighed.)

(6) The composition of the milk. (Each mess of milk was analyzed for five successive days during the last week of each period.)

From the facts supplied by such a collection of data it was hoped to derive evidence of a somewhat decisive character, so far as this can be accomplished by a single experiment. These data are displayed in the several tables of figures which follow.

RATIONS.

| | | |
|---|---|---|
| Period 1. | Nov. 21st to Dec. 18th, | 14 pounds Barley Hay.<br>40 pounds Southern Corn silage (No. CLXX).<br>6 pounds grain mixture. |
| Period 2. | Dec. 19th to Jan. 18th, | 14 pounds Barley Hay.<br>30 pounds Maine Field Corn silage (No. CLXXI).<br>*6 pounds grain mixture. |
| Period 3. | Jan. 19th to Feb. 16th, | 12 pounds Timothy Hay.<br>40 pounds Southern Corn silage (No. CLXXVI).<br>*6 pounds grain mixture. |

* The cow Nancy Avondale was fed 7 pounds grain mixture.

TABLE XXXIII.

COMPOSITION OF FOODS.

| | Dry matter. | Digestible material. | | | |
|---|---|---|---|---|---|
| | | Organic matter. | Protein. | Carbo-hydrates. | Fat. |
| | % | % | % | % | % |
| Southern Corn silage, CLXX*.. ... | 13.5 | 8.3 | 1.10 | 6.8 | .25 |
| Southern Corn silage, CLXXVI*.. . | 16.2 | 10.0 | 1.70 | 7.8 | .50 |
| Field Corn silage, CLXXI ..... | 22.3 | 16.8 | 1.50 | 14.7 | .65 |
| Barley Hay*..... | 85.37 | 50.3 | 7.4 | 40.6 | 1.00 |
| Timothy Hay..... | 87.50 | 48.2 | 3.33 | 42.9 | 1.76 |
| Corn meal ..... | 89.4 | 77.3 | 8.0 | 65.4 | 4.25 |
| Bran..... | 88.5 | 51.8 | 13.2 | 34.8 | 2.9 |
| Gluten meal ..... | 90.4 | 78.9 | 22.9 | 48.7 | 5.35 |
| Cotton seed meal ..... | 91.8 | 68.5 | 36.8 | 17.9 | 12.3 |

* The composition and digestibility of these foods were actually determined. For the other foods average figures were used.

TABLE XXXIV.

NUTRANTS IN DAILY RATIONS,—(POUNDS).

| | | Dry matter. | Total organic matter. | Protein. | Carbo-hydrates. | Fats. |
|---|---|---|---|---|---|---|
| *First period ..... | | 22.7 | 14.23 | 2.47 | 11.15 | .61 |
| *Second period..... | | 24.0 | 16.00 | 2.47 | 12.84 | .71 |
| *Third period. ..... | | 22.4 | 14.00 | 2.07 | 11.02 | .91 |
| Nancy Avondale | Second period..... | 24.9 | 16.7 | 2.63 | 13.3 | .77 |
| | Third period... | 23.2 | 14.5 | 2.23 | 11.4 | .84 |

* The same for all cows except Nancy Avondale.

TABLE XXXV.

WATER DRANK DAILY.

| | Agnes—pounds. | Dins.—pounds. | L. T.—pounds. | Shaw—pounds. | N. A.—pounds. |
|---|---|---|---|---|---|
| First period | 52.4 | 56.8 | 48.1 | 53.0 | |
| Second period | 51.4 | 56.5 | 48.0 | 51.9 | 65.6 |
| Third period | 45.9 | 48.9 | 45.7 | 40.8 | 57.4 |

TABLE XXXVI.

WEIGHTS OF THE COWS.

| First Period. | Agnes. | Dins. | L. T. | Shaw. | N. A. |
|---|---|---|---|---|---|
| First week | *870 | 867 | 836 | 965 | |
| Second week | 870 | 853 | 831 | 958 | |
| Third week | 863 | 843 | 834 | 955 | |
| Fourth week | 861 | 850 | 840 | 945 | |
| Average | 866 | 853 | 835 | 956 | |
| Second Period. | | | | | |
| First week | 845 | 847 | 821 | 938 | 990 |
| Second week | 837 | 832 | 816 | 929 | 990 |
| Third week | 834 | 830 | 823 | 946 | 987 |
| Fourth week | 833 | 832 | 820 | 946 | 986 |
| Average | 837 | 835 | 820 | 940 | 988 |
| Third Period. | | | | | |
| First week | 843 | 843 | 830 | 963 | 965 |
| Second week | 852 | 845 | 835 | 976 | 958 |
| Third week | 838 | 841 | 837 | 959 | 955 |
| Fourth week | 840 | 845 | 833 | 952 | 945 |
| Average | 843 | 843 | 834 | 962 | 956 |

* Each number represents the average of three weighings.

## TABLE XXXVII.

MILK YIELD,—POUNDS PER WEEK.

| | N. A. | Agnes. | Dins. | L. T. | Shaw. |
|---|---|---|---|---|---|
| November 27th to December 18th, inclusive, 22 days. | | | | | |
| First week | | 185.4 | 181.4 | 175.9 | 141.3 |
| Second week | | 176.3 | 177.5 | 170.1 | 138.6 |
| Third week | | 174.3 | 174.7 | 166.1 | 142.1 |
| Last day | | 26.5 | 24.6 | 25.3 | 20.0 |
| Total yield | | 562.4 | 558.3 | 537.4 | 442.0 |
| Average daily yield | | 25.6 | 25.3 | 24.4 | 20.1 |
| December 25th to January 18th, inclusive, 25 days. | | | | | |
| First week | 246.3 | 172.6 | 169.5 | 173.0 | 139.1 |
| Second week | 239.9 | 176.5 | 177.4 | 175.8 | 143.9 |
| Third week | 236.7 | 172.3 | 175.6 | 164.7 | 137.1 |
| Last four days | 138.9 | 98.0 | 99.1 | 98.6 | 73.9 |
| Total yield | 861.7 | 619.4 | 621.6 | 612.2 | 494.0 |
| Average daily yield | 34.5 | 24.8 | 24.9 | 24.5 | 19.8 |
| January 22d to February 16th, inclusive, 26 days. | | | | | |
| First week | 224.0 | 159.0 | 167.7 | 172.7 | 131.0 |
| Second week | 225.0 | 158.5 | 162.0 | 167.4 | 127.6 |
| Third week | 214.1 | 153.4 | 157.6 | 164.5 | 127.5 |
| Last five days | 151.3 | 106.4 | 108.9 | 112.5 | 88.7 |
| Total yield | 814.4 | 577.4 | 596.3 | 617.1 | 474.9 |
| Average daily yield | 31.3 | 22.2 | 22.9 | 23.7 | 18.3 |

## TABLE XXXVIII.

AVERAGE DAILY YIELD OF MILK.

| | Agnes. Pounds. | Dins. Pounds. | L. T. Pounds. | Shaw. Pounds. | N. A. Pounds. |
|---|---|---|---|---|---|
| First period, Nov. 27th to Dec. 18th—22 days | 25.6 | 25.3 | 24.4 | 20.1 | |
| Second period, Dec. 25th to Jan. 18th—25 days | 24.8 | 24.9 | 24.5 | 19.8 | 34.5 |
| Third period, Jan. 22d to Feb. 16th—26 days | 22.2 | 22.9 | 23.7 | 18.3 | 31.3 |

TABLE XXXIX.

AVERAGE COMPOSITION OF FIVE DAYS' MILK IN EACH PERIOD.

| | Agnes. | | Dins. | | L. T. | | Shaw. | | N. A. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Solids. | Fat. | Solids. | Fat. | Solids. | Fat. | Solids. | Fat. | Solids. | Fat. |
| | % | % | % | % | % | % | % | % | % | % |
| First period | 13.44 | 4.4 | 14.02 | 4.5 | 12.99 | 3.9 | 14.22 | 4.8 | | |
| Second period | 14.09 | 4.8 | 14.56 | 4.9 | 13.84 | 4.4 | 15.16 | 5.4 | 12.05 | 3.2 |
| Third period | 14.02 | 4.9 | 14.68 | 5.1 | 13.46 | 4.4 | 14.72 | 5.3 | 11.66 | 3.0 |

TABLE XL.

DAILY YIELD OF MILK SOLIDS,—POUNDS.

| | Agnes. | Dins. | L. T. | Shaw. | N. A. | Average. |
|---|---|---|---|---|---|---|
| First period | 3.43 | 3.55 | 3.17 | 2.85 | – | 3.24 |
| Second period | 3.49 | 3.62 | 3.39 | 3.00 | 4 15 | *3.37 |
| Third period | 3.11 | 3.37 | 3.19 | 2.69 | 3.65 | *3.09 |

* N. A. not included in these averages.

TABLE XLI.

POUNDS DIGESTIBLE FOOD EATEN FOR EACH POUND MILK SOLIDS PRODUCED.

| | Agnes. | Dins. | L. T. | Shaw. | N. A. | Average. |
|---|---|---|---|---|---|---|
| First period | 4.16 | 4.00 | 4.49 | 4.99 | – | 4.41 |
| Second period | 4.58 | 4.42 | 4.72 | 5.33 | 4.02 | *4.79 |
| Third period | 4.50 | 4.15 | 4.39 | 5.20 | 4.00 | *4.56 |

* Averages, excluding N. A.

It appears that in the first two feeding periods fourteen pounds of barley hay and mixed grain were fed besides the silage, and that in the third period twelve pounds of Timothy hay took the place of the barley hay. Forty pounds of Southern corn silage were fed in the first and last periods and thirty pounds of Field corn silage in the middle or second period. The daily digestible food for each of the three periods was 14.23 pounds, 16 pounds and 14 pounds respectively, so that the substitution of thirty pounds of Maine field corn silage for forty pounds of Southern corn silage had the effect of increasing the daily composition of digestible material by nearly two pounds. The fact that the daily ration of digestible material did not remain practically the same in all periods, introduces an element of uncertainty into the conclusions which may be drawn.

The relative effect of these rations must be seen, if at all, by studying their effect upon the bodily condition of the animals and upon the production of milk. If we do this we find that the cows lost from fifteen to thirty pounds weight in passing from the first to the second periods and that this loss was partially regained during the third period. These changes in live weight can be readily explained by the less weight of silage eaten in the second period, with no marked change in the quantity of water drank in any period.

Ordinarily in an experiment of this kind, extending through three months or more, there is a gradual but continuous decrease in the volume of the milk yield, unless there is a change in the food favorable to an increased milk production. When we see that in the second period of this experiment practically the same weight of milk was produced, and that owing to an increase in the dry matter of the milk there was actually a larger production of milk solids, we have good presumptive evidence that the ration containing the thirty pounds of Field corn silage was more efficient than the previous ration containing forty pounds of Southern corn silage. This evidence is strengthened by the fact that when in the third period a return is made to the Southern corn silage the yield of milk solids is decidedly diminished. Nevertheless, as stated in the preliminary discussion of feeding experiments, minor differences in two rations, such as existed in this experiment are not easily measured where so many uncontrolled and unmeasured factors exist.

The best possible analysis of the evidence that is secured in this case seems, however, to be entirely in favor of the conculsion that pound for pound the Maine Field Corn Silage was worth more than the Southern Corn silage, and that the difference was practically in the proportion of the amount of digestible dry substance in the two materials. This is the result which a careful consideration of the facts learned in other ways would lead us to expect.

## THE INFLUENCE OF WIDELY DIFFERING RATIONS UPON THE QUANTITY AND QUALITY OF MILK.

There is no question more generally discussed by dairymen just at this time than the influence of the food of a cow upon the amount and kind of milk. It is agreed on all sides that the quantity of milk is up to a certain limit very largely dependent upon the quantity and kind of food. Many farmers also express themselves as convinced that the quality of milk is materially modified by the kind of food, and so we hear such expressions as "feeding for milk" and "feeding for butter," as though a ration that will cause an increased flow of milk will not necessarily increase the butter production.

The opinion largely held by agricultural chemists and others who regard this question in the light of the results of experiment and investigation, is that the quality of milk is practically controlled by the individuality of the animal and that within the limits of healthful feeding the composition of the milk is not to be greatly influenced by the kind of food. It is conceded that marked changes occur in the milk of the same animal, such as daily variations, and variations due to protracted lactation, changes of season, weather and other causes not well defined. The fat in the milk may differ one per cent on two successive days, without apparent cause, although at other times a reasonable explanation may appear. The fact that when cows are fed each day exactly the same quantity of the same kind of food the milk does not remain constant in composition, but varies to a material extent, furnishes an element of uncertainty in interpreting the results of those feeding experiments which have for their object a study of the influence of food upon milk. It is not always easy to become satisfied that any change in the milk is due to a known cause.

Many experiments have been carried on for the purpose of throwing light upon the problem here presented, and while the testimony

is largely on one side, it is to some extent conflicting. Up to the present date, however, the concensus of opinion is as before stated, that the animal is the determinative factor. There are numerous facts in common experience which accord with this opinion. Every farmer recognizes marked differences in the milk of the several animals in his herd and he is well aware that by no sort of manipulation of food can he obliterate these differences and reduce the milk of all his different animals to a dead level of quality. Whatever practice he may adopt in feeding he will still have "poor-milk" cows and "rich-milk" cows. It is a matter of common observation that certain breeds furnish milk of a characteristic quality and no one has yet discovered a way of converting a Jersey's milk into the kind the larger and more showy Holstein yields, neither do we know how to coerce the latter into supplying us with the richness of color and composition which we have imported from the Channel Islands. It is reasonable to regard lactation as a function, which, both as to the kind and the maximum quantity of the product, is fixed chiefly by the constitutional limitations of the individual.

It has been supposed possible for changes in the food to cause the composition of the resulting milk to vary in two ways, viz: by increasing or decreasing the percentage of solid matter, and by changing the composition of the solids, as for instance, increasing the fat without a corresponding increase of casein.

The experiment with cows, the results of which are given in this connection, was planned with reference to changes in the rations so radical as to induce if possible corresponding variations in the character of the milk. The attempt was not to compare a starvation diet with liberal feeding, because no one believes a starvation ration to be wise or profitable, and liberal feeding is universally regarded as a part of the creed of successful agriculture. But while there is a general agreement that the ration should be generous in quantity and agreeable in quality, there is much discussion as to the way in which this ration should be compounded and the relative effcet of different mixtures of the nutrients, and so the rations in this experiment were made to differ very widely in the relation of the nitrogenous to the non-nitrogenous nutrients.

The experiment was begun with four cows, one of which was dropped out and results are reported from only three. The three feeding periods covered one hundred and five days, or thirty-five days each.

The three cows were designated as A, R, and L. T. The two rations compared were as follows:

RATION 1.

| | |
|---|---|
| Timothy hay | ad lib. |
| Corn meal | 2 pounds. |
| Cotton-seed meal | 2 pounds. |
| Gluten meal | 2 pounds. |

RATION 2.

| | |
|---|---|
| Timothy hay | ad lib. |
| Corn meal | 6 pounds. |

Ration 1 was fed to A during the first and third periods, and to R and L. S. during the second or middle period. Ration 2 was fed to A in the middle period and to R and L. S. in the first and third periods.

A record was made of the food consumed and of the weights of milk produced. During the last five days of each period the milk was analyzed. The butter was also submitted to tests for melting points, the percentages of volatile acids and for the iodine absorption equivalent.

The data are all given in the subsequent tables.

TABLE XLII.

FOOD EATEN.

Cow A.

| Period 1. | Period 2. | Period 3. |
|---|---|---|
| 804 lbs. Timothy hay.<br>70 lbs. corn meal.<br>70 lbs. gluten meal.<br>70 lbs. cotton-seed meal. | 740 lbs. Timothy hay.<br>210 lbs. corn meal. | 750 lbs. Timothy hay.<br>70 lbs. corn meal.<br>70 lbs. gluten meal.<br>70 lbs. cotton-seed meal |
| Cow R. | | |
| 777 lbs. Timothy hay.<br>210 lbs. corn meal. | 770 lbs. Timothy hay.<br>70 lbs. corn meal.<br>70 lbs. gluten meal.<br>70 lbs. cotton-seed meal. | 710 lbs. Timothy hay.<br>210 lbs. corn meal. |
| Cow L. T. | | |
| 777 lbs. Timothy hay.<br>210 lbs. corn meal. | 770 lbs. Timothy hay.<br>70 lbs. corn meal.<br>70 lbs. gluten meal.<br>70 lbs. cotton-seed meal. | 680 lbs. Timothy hay.<br>210 lbs. corn meal. |

AVERAGE WEIGHTS OF COWS,—POUNDS.

| | Cow A. | Cow R. | Cow L. T. |
|---|---|---|---|
| First period | 876 | 859 | 866 |
| Second period | 872 | 853 | 837 |
| Third period | 846 | 840 | 831 |

TABLE XLIII.

DAILY RATIONS IN TERMS OF DIGESTIBLE NUTRIENTS,—POUNDS.

| PERIOD 1. | Cow 1. | Cow 2. | Agnes. |
|---|---|---|---|
| Dry substance | 24.8 | 24.8 | 25.5 |
| Organic digestible matter | 15.3 | 15.3 | 15.6 |
| Digestible protein | 1.21 | 1.21 | 2.12 |
| Digestible carbonydrates | 13.4 | 13.4 | 12.5 |
| Digestible fats | .64 | .64 | .85 |
| Nutritive ratio | 1: 12.3 | 1: 12.3 | 1: 6.8 |
| PERIOD 2. | | | |
| Dry substance | 24.7 | 24.7 | 23.8 |
| Organic digestible matter | 15.1 | 15.1 | 14.8 |
| Digestible protein | 2.09 | 2.09 | 1.18 |
| Digestible carbohydrates | 12.07 | 12.07 | 12.97 |
| Digestible fat | .84 | .84 | .63 |
| Nutritive ratio | 1: 6.7 | 1: 6.7 | 1: 12.3 |
| PERIOD 3. | | | |
| Dry substance | 23.1 | 22.3 | 24.1 |
| Digestible organic matter | 14.4 | 14. | 14.8 |
| Digestible protein | 1.15 | 1.13 | 2.06 |
| Digestible carbohydrates | 12.62 | 12.24 | 11.82 |
| Digestible fats | .81 | .60 | .82 |
| Nutritive ratio | 1: 12.3 | 1: 12.00 | 1: 6.6 |

## TABLE XLIV.

YIELDS OF MILK.

*Period 1. (December 12th to January 15th inclusive.)*

| | Cow A. Nitrogenous ration.—pounds. | Cow R. Corn meal ration.—pounds. | Cow L. T. Corn meal ration.—pounds. |
|---|---|---|---|
| First week | 172.0 | 126.5 | 128.7 |
| Second week | 185.9 | 114.2 | 120.8 |
| Third week | 182.0 | 128.5 | 128.0 |
| Fourth week | 183.2 | 106.6 | 116.4 |
| Fifth week | 190.6 | 168.7 | 112.9 |
| Total for last four weeks | 741.7 | 458.1 | 478.0 |
| Average per day | 26.5 | 16.4 | 17.4 |

*Period 2. (January 16th to February 19th inclusive.)*

| | Cow A. Corn meal ration.—pounds. | Cow R. Nitrogenous ration.—pounds. | Cow L. T. Nitrogenous ration.—pounds. |
|---|---|---|---|
| First week | 175.4 | 129.2 | 117.3 |
| Second week | 151.8 | 149.1 | 139.7 |
| Third week | 146.0 | 149.8 | 135.6 |
| Fourth week | 133.2 | 141.6 | 130.2 |
| Fifth week | 129.3 | 146.1 | 128.6 |
| Total for last four weeks | 560.2 | 580.6 | 534.2 |
| Average per day | 20.0 | 20.7 | 19.1 |

TABLE XLIV—CONCLUDED.

*Period 3. (February 20th to March 25th inclusive.)*

| | Cow A. Nitrogenous ration.—pounds. | Cow R. Corn meal ration.—pounds. | Cow L. T. Corn meal ration.—pounds. |
|---|---|---|---|
| First week | 154.4 | 124.1 | 114.0 |
| Second week | 176.8 | 108.1 | 110.5 |
| Third week | 172.5 | 106.3 | 100.7 |
| Fourth week | 172.4 | 95.4 | 98.9 |
| Fifth week | 169.3 | 84.0 | 87.8 |
| Total for last four weeks | 691.0 | 393.8 | 397.9 |
| Average per day | 24.7 | 14.1 | 14.2 |

SUMMARY.

| | Cow A. Pounds. | Cow B. Pounds. | Cow L. T. Pounds. |
|---|---|---|---|
| Average total yield on nitrogenous ration | 716.4 | 580.6 | 534.2 |
| Average total yield on corn meal ration | 560.2 | 425.9 | 437.9 |
| Excess of yield with nitrogenous ration | 156.2 | 154.7 | 96.3 |
| Daily yield with nitrogenous ration | 25.6 | 20.7 | 19.1 |
| Daily yield with corn meal ration | 20.0 | 15.2 | 15.6 |
| Daily excess with nitrogenous ration. | 5.6 | 5.5 | 3.5 |

## TABLE XLV.

COMPOSITION OF THE MILK.

| | | Total solids. % | Casein and albumen. % | Fat. % |
|---|---|---|---|---|
| Cow A., | First period, nitrogenous ration. | 14.06 | 3.76 | 4.70 |
| | Second period, corn meal ration. | 13.39 | 3.45 | 4.24 |
| | Third period, nitrogenous ration | 14.17 | 3.51 | 4.74 |
| Cow R., | First period, corn meal ration.... | 13.26 | 3.47 | 4.07 |
| | Sec'nd period, nitrogenous rat'n, | 13.92 | 3.67 | 4.77 |
| | Third period, corn meal ration.. | 14.03 | 3.38 | 4.84 |
| Cow L. T., | First period, corn meal ration... | 13.38 | 3.48 | 3.99 |
| | Sec'nd period, nitrogenous rat'n, | 14.27 | 3.67 | 4.72 |
| | Third period, corn meal ration.. | 13.62 | 3.12 | 4.55 |

## TABLE XLVI.

YIELD OF MILK SOLIDS.

| | | In 28 days. | In one day. |
|---|---|---|---|
| Cow A., | First period, nitrogenous ration ..... | 104.3 pounds | 3.72 pounds |
| | Second period, corn meal ration ..... | 75.0 pounds | 2.68 pounds |
| | Third period, nitrogenous ration ..... | 97.9 pounds | 3.50 pounds |
| Cow R., | First period, corn meal ration ..... | 60.7 pounds | 2.17 pounds |
| | Second period, nitrogenous ration ..... | 80.8 pounds | 2.88 pounds |
| | Third period, corn meal ration ..... | 55.3 pounds | 1.97 pounds |
| Cow L. T., | First period, corn meal ration..... | 63.9 pounds | 2.28 pounds |
| | Second period, nitrogenous ration..... | 76.2 pounds | 2.72 pounds |
| | Third period, corn meal ..... | 54.2 pounds | 1.93 pounds |

SUMMARY.

| | Cow A. | Cow R. | Cow L. T. |
|---|---|---|---|
| | Pounds. | Pounds. | Pounds. |
| Av. daily yield milk solids on nitrogenous ration, | 3.61 | 2.88 | 2.72 |
| Av. daily yield milk solids on corn meal ration.. | 2.68 | 2.07 | 2.10 |
| Excess with nitrogenous ration..... | .93 | .81 | .62 |

TABLE XLVII.

RELATION IN QUANTITY OF THE COMPOUNDS OF THE MILK.

| Cow A. | Relation of casein to fat. Casein=100. | Relation of fat to total solids. Fat=100. |
|---|---|---|
| First period, nitrogenous ration | 100:125 | 100:300 |
| Second period, corn meal ration | 100:123 | 100:315 |
| Third period, nitrogenous ration | 100:135 | 100:299 |
| Cow R. | | |
| First period, corn meal ration | 100:117 | 100:325 |
| Second period, nitrogenous ration | 100:130 | 100:292 |
| Third period, corn meal ration | 100:143 | 100:290 |
| Cow L. T. | | |
| First period, corn meal ration | 100:115 | 100:335 |
| Second period, nitrogenous ration | 100:129 | 100:302 |
| Third period, corn meal ration | 100:146 | 100:300 |

TABLE XLVIII.

BUTTER CHARACTERISTICS.

| Cow A. | Melting point. C°. | Volatile acids. | Iodine equivalent. |
|---|---|---|---|
| First period, nitrogenous ration | 33.2 | 32.9 | 28.0 |
| Second period, corn meal ration | 34.0 | 29.9 | 26.7 |
| Third period, nitrogenous ration | 33.1 | 30.1 | 30.0 |
| Cow R. | | | |
| First period, corn meal ration | 34.0 | 32.6 | 30.0 |
| Second period, nitrogenous ration | 33.2 | 31.4 | 29.4 |
| Third period, corn meal ration | 34.2 | 32.8 | 29.6 |
| Cow L. T. | | | |
| First period, corn meal ration | 31.1 | 33.2 | 33.1 |
| Second period, nitrogenous ration | 29.3 | 30.7 | 24.6 |
| Third period, corn meal ration | 30.0 | 30.8 | 20.3 |

The foregoing data, which as stated, are the result of an attempt to study the influence of widely varying rations upon the production and characteristics of milk, give conclusive evidence in regard to but one of the several points considered. The figures tabulated give information about,

(1) The total and digestible food consumed.
(2) The body weights of the animals.
(3) The milk yield.
(4) The composition of the milk.
(5) The yield of milk solids.
(6) The composition of the milk solids.
(7) Certain chemical and physical characteristics of the butter fat.

A review of these data warrant the following summary:

(1) Milch cows were fed two rations differing widely in the amount of protein which they contained. The hay was the same in both, also the weight of grain, but in one the grain consisted wholly of corn meal while in the other it was made up of cotton-seed, gluten and corn meals in equal parts.

(2) Both rations furnished practically the same amount of digestible material. The proportion of digestible protein was nearly twice as great in the mixed grain ration as in the corn meal ration.

(3) The cows did not vary greatly in body weight, but their general appearance showed less thrift while being fed the corn meal ration.

(4) The yield of milk from the nitrogenous ration was from one-fifth to more than one-third larger than that from the corn meal ration, the excess ranging with the three cows from 20 per cent to 36 per cent, or an average of about five pounds of milk per day.

(5) In general the milk was materially richer while the cows were fed the ration rich in protein, though with one cow it showed the largest percentage of solids during the third period while she was eating the corn meal ration. With the other two cows the influence of the mixture of cotton-seed meal, gluten meal and corn meal in increasing the per cent of solids of the milk seemed quite marked.

(6) The daily yield of milk solids was from thirty to forty per cent greater with the more nitrogenous ration.

(7) The composition of the milk solids seemed to be independent of the ration. In general the proportion of fat increased throughout the experiment without regard to what the cows were fed, and no evidence is furnished in support of the notion that by changing the food it is possible to produce more butter fat without an accompanying increased production of the other milk solids. In other words, it appears that the most profitable food for butter production will also be most profitable for the milk farmer or cheese maker. The relation of fat to the other solids seems to be determined by the animal or by certain unknown conditions of environment rather than by the food.

(8) So far as could be learned by chemical tests, the butter made from the two rations was not greatly different.

## FEEDING EXPERIMENTS WITH SWINE.

More or less experimental feeding with swine has been going on at the station since the last report that was made of similar work in 1890. These experiments have been practical rather than scientific, and have not resulted as satisfactorily in all respects as was desired. They have centered chiefly around two main considerations: First, the relative economic value of several breeds of swine, special attention being paid to the Tamworths, and to a cross of this breed with the Berkshire; second, the relative value of the dry matter of skimmed milk and an equivalent amount of digestible material from some nitrogenous vegetable food.

The Tamworth swine used as a basis of these experiments were a fine pair of these animals presented to the station by J. M. Sears, Esq., of Boston, Mass., to whom the station is greatly indebted. The female has produced several litters of pigs, and certain of these have been used in the feeding tests. Crosses have also been secured by the use of the Tamworth male and Berkshire females, and as will be seen by the results obtained, these animals have proved to be desirable.

Three lots of animals have been grown from young pigs to a marketable condition. The first lot included Cheshires, Jersey Reds and White Chesters, the second lot Tamworths and Tamworth-Berkshires, and the third lot Tamworths, Berkshires and Tamworth-Berkshires.

The first lot lived mostly in pens out of doors, having shelter from inclement weather. The other lots were grown in indoor pens.

A careful record of food consumed and weights of animals was kept. The food was weighed daily and the animals once a week.

The foods were not analyzed, but are assumed to have the average composition, which for milk and grains may be safely regarded as involving only a small error.

By the use of the figures given in Jenkins' and Winton's tables, and of digestion co-efficients selected from American and German work, the following percentages of digestible material are found to be contained in the food used in these experiments, and these percentages have been applied in calculating the digestible organic nutrients actually consumed.

TABLE XLIX.

COMPOSITION OF FOODS USED IN FEEDING EXPERIMENTS WITH SWINE.

| | Dry matter in 100 pounds. | Digestible nutrients in 100 pounds. | | | |
|---|---|---|---|---|---|
| | | Total organic matter. | Protein. | Carbohydrates. | Fats. |
| Corn meal | 89.4 | 80.8 | 8.8 | 74.3 | 3.85 |
| Fancy middlings | 89.3 | 67.3 | 12.0 | 53.6 | 3.2 |
| Gluten meal | 90.4 | 82.5 | 25.3 | 49.8 | 4.85 |
| Mangolds* | 11.7 | 9.0 | .93 | 8.1 | .12 |
| Oats (ground) | 89.0 | 60.2 | 9.1 | 47.2 | 4.15 |
| Pea meal | 89.5 | 79.2 | 17.8 | 59.4 | .59 |
| Skimmed milk | 10.0 | 9.2 | 3.5 | 5.2 | .5 |
| Sugar beets* | 16.2 | 15.0 | 1.42 | 13.4 | .07 |

* Actual analyses were made of these materials.

In the tables which succeed, may be found a statement of the results of these experiments.

TABLE L.

EXPERIMENT OF 1891 WITH SWINE.

| | White Chester. | Jersey Red. | Cheshire. |
|---|---|---|---|
| Number of animals | 2 | 2 | 1 |
| Days fed | 140 | 157 | 157 |
| Skimmed milk consumed* | 1800 | 1884 | 1256 |
| Middlings consumed | 1056 | 1123 | 663 |
| Total dry matter consumed | 1123 | 1191.2 | 717.6 |
| Digestible protein consumed | 189.7 | 200.7 | 123.5 |
| Digestible carbohydrates consumed | 659.5 | 699.9 | 420.7 |
| Digestible fats consumed | 42.8 | 45.3 | 27.5 |
| Total digestible matter consumed, (organic) | 892.0 | 945.9 | 571.7 |
| Dry matter consumed daily | 4.01 | 3.79 | 4.57 |
| Digestible organic matter consumed daily | 3.18 | 3.01 | 3.64 |
| Initial weight of pigs | 129 | 114 | 82 |
| Last weight of pigs | 449 | 437 | 265 |
| Total gain of pigs | 320 | 323 | 183 |
| Daily gain of pigs | 1.15 | 1.03 | 1.16 |
| Digestible organic matter eaten per pound of gain | 2.78 | 2.93 | 3.12 |

* All figures representing weights are in pounds.

TABLE LI.

EXPERIMENT OF 1891-2.

*Early Growth of Tamworths and Tamworth-Berkshires.*

| | Lot 1. Skimmed milk with grain. | | Lot 2. Grain ration, no milk. | |
|---|---|---|---|---|
| | Tamworth pigs. | Tamworth-Berkshire pigs. | Tamworth pigs. | Tamworth-Berkshire pigs. |
| Number of animals | 2 | 3 | 2 | 2 |
| Days fed | 126 | 98 | 126 | 98 |
| Skimmed milk consumed | 2,506 | 2,184 | | |
| Corn meal consumed | 211.0 | 273.0 | 254.5 | |
| Sugar beets consumed | 422 | - | 427 | |
| Mangolds consumed | - | 294 | - | 196 |
| Gluten meal consumed | - | - | 254.5 | |
| Peas consumed | - | - | - | 182.5 |
| Oats consumed | - | - | - | 182.5 |
| Dry matter consumed | 507.7 | 496.8 | 527.5 | 348.5 |
| Dry matter consumed daily | 2.01 | 1.69 | 2.09 | 1.78 |
| Digestible protein consumed | 112.3 | 103.3 | 92.5 | 51.1 |
| Digestible carbohydrates consumed | 328.2 | 319.3 | 354.4 | 210.2 |
| Digestible fats consumed | 20.9 | 21.5 | 22.4 | 8.9 |
| Digestible organic matter consumed | 461.4 | 444.1 | 469.3 | 270.2 |
| Digestible organic matter consumed daily | 1.85 | 1.52 | 1.90 | 1.39 |
| Initial weight of pigs | 73.0 | 81.0 | 75.0 | 53.0 |
| Last weight of pigs | 217.0 | 260.0 | 199.0 | 132.0 |
| Total gain of pigs | 144.0 | 179.0 | 124.0 | 79.0 |
| Daily gain per pig | .57 | .61 | .48 | .40 |
| Digestible organic matter eaten for each pound of gain | 3.18 | 2.48 | 3.78 | 3.42 |

TABLE LII.

EXPERIMENT 1891-2, (Continued).

*Later, Growth Tamworths, and Tamworth-Berkshires.*

| | Lot fed more skim-milk. | Lot fed less skim-milk. |
|---|---|---|
| Number of animals | 2 | 2 |
| Days fed | 148 | 148 |
| Skimmed milk consumed | 4,116 | 2,058 |
| Corn meal consumed | 1,435 | 1,435 |
| Pea meal consumed | | 147 |
| Oat meal consumed | | 147 |
| Dry matter consumed | 1,694.5 | 1,750.9 |
| Dry matter consumed daily per pig | 5.72 | 5.91 |
| Digestible protein consumed | 271 | 238.7 |
| Digestible carbohydrates consumed | 1,175.4 | 1,225.1 |
| Digestible fats consumed | 75.8 | 72.5 |
| Digestible organic matter | 1,522.2 | 1,536.3 |
| Digestible organic matter fed daily per pig | 5.15 | 5.20 |
| Initial weight of pigs | 208 | 218 |
| Last weight of pigs | 676 | 691 |
| Total gain | 468 | 473 |
| Daily gain per pig | 1.58 | 1.60 |
| Digestible organic matter eaten per pound of gain | 3.26 | 3.27 |

TABLE LIII.

EXPERIMENT 1892.

*Period 1. Food, Skimmed Milk and Ground Oats.*

| | Tamworth. | Berkshire. | Tamworth-Berkshire. |
|---|---|---|---|
| Number of animals | 4 | 4 | 4 |
| Days fed | 112 | 112 | 112 |
| Skimmed milk consumed | 1,792 | 1,792 | 1,792 |
| Oat meal consumed | 855 | 1,039 | 855 |
| Dry matter consumed | 940.1 | 1,103.9 | 940.1 |
| Dry matter consumed daily per pig | 2.10 | 2.46 | 2.10 |
| Digestible protein consumed | 140.5 | 157.2 | 140.5 |
| Digestible carbohydrates consumed | 496.8 | 583.6 | 496.8 |
| Digestible fats consumed | 43.9 | 52 | 43.9 |
| Digestible organic matter consumed | 681.2 | 792.8 | 681.2 |
| Digestible organic matter consumed daily per pig | 1.53 | 1.76 | 1.53 |
| Initial weight of pigs | 74 | 110 | 65 |
| Last weight of pigs | 397 | 470 | 400 |
| Total gain | 323 | 336 | 335 |
| Daily gain per pig | .72 | .75 | .75 |
| Digestible organic matter eaten for each pound of gain | 2.11 | 2.36 | 2.03 |

TABLE LIII—CONTINUED.

*Period 2. Food, Skimmed Milk, Pea Meal and Corn Meal.*

| | Tamworth. | Berkshire. | Tamworth-Berkshire. |
|---|---|---|---|
| Number of animals | 4 | 4 | 4 |
| Days fed | 42 | 42 | 42 |
| Skimmed milk consumed | 672 | 672 | 672 |
| Pea meal consumed | 172.6 | 200.6 | 172.6 |
| Corn meal consumed | 345.4 | 401.4 | 345.4 |
| Dry matter consumed | 530.3 | 605.4 | 530.3 |
| Dry matter consumed daily per pig | 3.15 | 3.60 | 3.15 |
| Digestible protein consumed | 84.6 | 94.5 | 84.6 |
| Digestible carbohydrates consumed | 368.5 | 422.6 | 368.5 |
| Digestible fats consumed | 17.8 | 20.1 | 17.8 |
| Digestible organic matter consumed | 470.9 | 537.2 | 470.9 |
| Digestible organic matter consumed daily per pig | 2.80 | 3.20 | 2.80 |
| Initial weight of pigs | 399 | 470 | 400 |
| Last weight of pigs | 544 | 611 | 546 |
| Total gain | 147 | 141 | 146 |
| Daily gain per pig | .87 | .84 | .87 |
| Digestible organic matter eaten for each pound of gain | 3.20 | 3.80 | 3.20 |

TABLE LIII—CONTINUED.

*Period 3. Food, Mixture Equal Parts Pea Meal, Oat Meal and Corn Meal.*

| | Tamworth. | Berkshire. | Tamworth-Berkshire. |
|---|---|---|---|
| Number of animals | 3 | 3 | 3 |
| Days fed | 63 | 49 | 63 |
| Pea meal consumed | 371 | 253 | 371 |
| Oat meal consumed | 371 | 253 | 371 |
| Corn meal consumed | 371 | 253 | 371 |
| Dry matter consumed | 993.0 | 677.8 | 993.0 |
| Dry matter consumed daily per pig | 5.25 | 4.61 | 5.25 |
| Digestible protein consumed | 131.4 | 90.3 | 131.4 |
| Digestible carbohydrates consumed | 643.4 | 439.5 | 643.4 |
| Digestible fats consumed | 31.3 | 22. | 31.3 |
| Digestible organic matter consumed | 806.1 | 551.8 | 806.1 |
| Digestible organic matter consumed daily per pig | 4.27 | 3.77 | 4.27 |
| Initial weight of pigs | 438 | 507 | 439 |
| Last weight of pigs | 638 | 601 | 668 |
| Total gain | 200 | 94 | 229 |
| Daily gain per pig | 1.06 | .64 | 1.21 |
| Digestible organic matter eaten for each pound of gain | 4.03 | 5.87 | 3.52 |

TABLE LIII—CONCLUDED.

*Period 4. Food, Skimmed Milk, Oat Meal and Corn Meal.*

| | Tamworth. | Berkshire. | Tamworth-Berkshire. |
|---|---|---|---|
| Number of animals | 3 | 3 | 3 |
| Days fed | 56 | 63 | 49 |
| Skimmed milk consumed | 1,680 | 1,890 | 1,470 |
| Oat meal consumed | 476.0 | 402.5 | 416.5 |
| Corn meal consumed | 476.0 | 402.5 | 416.5 |
| Dry matter consumed | 1,017.0 | 907.1 | 891.7 |
| Dry matter consumed daily per pig | 6.07 | 4.94 | 6.06 |
| Digestible protein consumed | 144.5 | 138.3 | 126.5 |
| Digestible carbohydrates consumed | 631.0 | 556.5 | 553.2 |
| Digestible fats consumed | 46.4 | 41.5 | 40.7 |
| Digestible organic matter consumed | 821.9 | 736.3 | 720.4 |
| Digestible organic matter consumed daily per pig | 4.89 | 4.01 | 4.90 |
| Initial weight of pigs | 638 | 601 | 668 |
| Final weight of pigs | 834 | 801 | 847 |
| Total gain | 196 | 200 | 179 |
| Daily gain per pig | 1.17 | 1.06 | 1.22 |
| Digestible organic matter eaten for each pound of gain, | 4.19 | 3.80 | 4.02 |

SUMMARY.

| | | | |
|---|---|---|---|
| Number of days fed | 273 | 266 | 266 |
| Digestible organic matter consumed | 2,780 | 2,618 | 2,678 |
| Total gain | 866 | 771 | 894 |
| Digestible organic matter for each pound of gain | 3.21 | 3.40 | 3.00 |

### RELATIVE GROWTH OF ANIMALS OF THE SEVERAL BREEDS.

The only fair comparison of the economy of production with animals from the several breeds is based upon the digestible food consumed for each pound of growth. The figures showing this have been brought together from the foregoing tables and can be seen in table 54.

TABLE LIV.

RELATION OF FOOD TO GROWTH.

(Pounds digestible organic material for each pound gain.)

| | Cheshire. | Poland China. | Yorkshire. | White Chester. | Jersey Red. | Berkshire. | Tamworth. | Tamworth-Berkshire. |
|---|---|---|---|---|---|---|---|---|
| Experiment—1890 | 2.88 | 2.73 | 2.50 | 2.50 | – | 2.45 | | |
| 1891 | 3.12 | – | – | 2.78 | 2.93 | | | |
| 1891-2, early growth | – | – | – | – | – | – | 3.18 | 2.48 |
| 1891-2, later growth | – | – | – | – | – | – | 3.71 | 2.89 |
| 1892, period 1 | – | – | – | – | – | 2.36 | 2.11 | 2.03 |
| 1892, period 2 | – | – | – | – | – | 3.80 | 3.20 | 3.20 |
| 1892, period 3 | – | – | – | – | – | 5.87 | 4.03 | 3.52 |
| 1892, period 4 | – | – | – | – | – | 3.80 | 4.19 | 4.02 |
| 1892, av. four periods, | – | – | – | – | – | 3.40 | 3.21 | 3.00 |

These experiments furnish no evidence of the superior producing capacity of any one of the breeds tested. It should be observed that with the exception of the Tamworths, Berkshires and the Tamworth-Berkshire cross the number of animals grown was too small to allow conclusions of much value.

It is certainly true of the Tamworth-Berkshire cross that the animals were finely formed and vigorous, and they certainly used food more economically than either the pure bred Tamworths or Berkshires. This cross has been admired by all who have seen it, and the market quality of their carcasses was highly commended.

### BUTCHERS' ANALYSIS OF THE CARCASSES.

It is evident that the present demands of the market are for pork of a somewhat different kind than was the case formerly. Now the retail meat trade calls for a rather small carcass that will cut a large proportion of lean parts, and as the lean cuts bear a higher

price than "clear pork" it is for the interest of both farmer and dealer that animals be grown which will supply the requirements of the market. Farmers are surely making a mistake in supposing that the fattest animals are certainly the most profitable. It is at least true that such animals tend to aggravate rather than amend the unbalanced diet to which Americans are so much given.

It was hoped that in the Tamworths would be found a breed of swine which with the use of proper rations would furnish to consumers a larger proportion of lean meat than is the case with the breeds more commonly in use, and in order to learn whether this hope would be realized a butcher's analysis has been made of the carcasses of several lots of animals, including five pure breeds and one cross. The most reliable comparison is that made between the Tamworths, Berkshires and the Tamworth-Berkshire cross. The results of this analysis can be seen in Table LV.

TABLE LV.

BUTCHER'S ANALYSIS OF THE CARCASSES.*

| | Dressed weight, pounds. | Weights of separate parts,—pounds. | | | | | | | Per cent of lean cuts. | Per cent of salting pork. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Hams. | Shoulders. | Spare-ribs. | Breakfast bacon. | Leaf lard. | Head and feet. | Salting pork. | | |
| Cheshire | 200 | 28.5 | 12 | 50 | – | 11 | 19 | – | 45 | |
| Chester | 171.5 | 25 | 13 | 44 | – | 7.7 | 21.5 | – | 48 | |
| Jersey Red | 172.5 | 25 | 9 | 38 | – | 11.5 | 18.75 | – | 41.7 | |
| Berkshire | 187 | 26 | 12.5 | 46.2 | – | 8.5 | 20 | – | 45.3 | |
| Berkshire | 233 | 33.5 | 19.5 | 48 | 19 | 14 | 22.5 | 76.5 | 43.3 | 32.8 |
| Berkshire | 199 | 31.5 | 17.5 | 33 | 12.5 | 12.5 | 18 | 74.3 | 41.1 | 37.3 |
| Berkshire | 215 | 30.5 | 19.7 | 49 | 13.5 | 12.5 | 18.2 | 71.6 | 46.1 | 33.3 |
| Average | – | – | – | – | – | – | – | – | 43.4 | 34.4 |
| Tamworth | 235 | 33.7 | 22.5 | 58 | 24.5 | 13 | 23 | 60.3 | 48.6 | 25.6 |
| Tamworth | 281 | 38.5 | 19.5 | 58.5 | 22.5 | 17.7 | 28.5 | 95.8 | 41.4 | 34.1 |
| Tamworth | 236 | 33.5 | 20 | 51 | 13.2 | 18.2 | 21.2 | 78.9 | 44.3 | 33.4 |
| Tamworth | 227 | 32.5 | 18 | 47.2 | 15.2 | 15 | 21.2 | 77.9 | 43 | 34.3 |
| Tamworth | 208 | 30.2 | 18.5 | 44 | 12.7 | 15.2 | 21 | 66.3 | 44.6 | 31.9 |
| Average | – | – | – | – | – | – | – | – | 44.4 | 31.9 |
| Tamworth-Berkshire | 341 | 43 | 24 | 67.5 | 27.5 | 21 | 27.2 | 130.8 | 39.4 | 38.4 |
| Tamworth-Berkshire | 292.5 | 38 | 25.7 | 62.5 | 29.5 | 16.2 | 23 | 97.6 | 43.2 | 33.4 |
| Tamworth-Berkshire | 234 | 29.5 | 20.5 | 49.7 | 12.5 | 16.2 | 18.2 | 87.4 | 42.6 | 37.3 |
| Tamworth-Berkshire | 228 | 31 | 18 | 50 | 12 | 15 | 18.2 | 83.8 | 43.4 | 36.8 |
| Average | – | – | – | – | – | – | – | – | 42.1 | 36.5 |

* These pigs were cut up and the parts weighed by Charles York & Co., Bangor, Me., to whom the Station is greatly indebted for this service.

The above figures show the proportional amount of lean cuts in the several animals. The term "lean cuts" is taken to mean the sum of the hams and shoulders trimmed and the spare-ribs.

The data here presented do not warrant the claim that any one of the breeds compared possesses superior market qualities over all the others. The Tamworth's gave a somewhat larger percentage of lean cuts and the Tamworth-Berkshire cross a larger proportion of salting pork. The differences are small, we may believe, compared with those which may be caused by age, food, or individual variations.

## THE RELATIVE VALUE OF DIGESTIBLE FOOD FROM ANIMAL AND FROM VEGETABLE SOURCES.

The report of the Maine Experiment Station for 1889 contains an account of experiments which had for their object, in part, a comparison of the dry matter of skimmed milk with the digestible part of pea meal as food for swine. Those experiments indicated a practical equivalence, pound for pound.

This matter has again been brought to a practical test in the experiments now under discussion. The growth of separate lots of pigs, selected from the same litter, and of the same lots of pigs during separate periods, has been compared when fed rations containing practically the same amount of digestible matter, but which was derived from unlike sources. As in the experiments of 1889, pea meal or oat meal was made to take the place of skimmed milk in the proportion of the digestible substance in the two.

In tables LVI and LVII are presented the figures showing the actual food required for a pound of growth.

## TABLE LVI.

EXPERIMENT IN WHICH THE SKIMMED MILK WAS REPLACED BY NITROGENOUS FOODS, WHOLLY OR IN PART.

| | Digestible organic food consumed for each pound of gain in live weight. | | |
|---|---|---|---|
| | Tamworths. | Tamworth-Berkshires. | Mixed lot of Tamworths and Tamworth-Berkshires. |
| Lot 1—Growth from one to four months. | | | |
| Food, skimmed milk, corn meal and beets | 3.18 | 2.48 | |
| Food, gluten and corn meal and beets | 3.78 | | |
| Food, pea meal, oat meal and beets | | 3.42 | |
| Lot 2—Growth from four to nine months. | | | |
| Food, skimmed milk* and corn meal | | | 3.26 |
| Food, skimmed milk† pea meal, oat meal and corn meal | | | 3.27 |

*Amount of milk daily, thirty pounds.

†Amount of milk daily, fifteen pounds. Part only of the skimmed milk was replaced by the pea and oat meals.

## TABLE LVII.

EXPERIMENT IN WHICH ONE RATION CONTAINED PEA MEAL IN THE PLACE OF SKIMMED MILK IN THE OTHER RATION.

| | Digestible organic food consumed for each pound of gain in live weight. | | |
|---|---|---|---|
| | Tamworths. | Berkshires. | Tamworth-Berkshires. |
| Growth from 1 to 4½ months. (Period 1.) | | | |
| Food, skimmed milk and ground oats | 2.11 | 2.36 | 2.03 |
| Growth from 4½ to 6 months. (Period 2.) | | | |
| Food, skimmed milk, pea meal and corn meal | 3.20 | 3.80 | 3.20 |
| Growth from 6 to 8½ months. (Period 3.) | | | |
| Food, equal parts pea meal, oat meal and corn meal | 4.03 | 5.87 | 3.52 |
| Growth from 8½ to over 10 months. (Period 4.) | | | |
| Food, skimmed milk, oat meal and corn meal | 4.19 | 3.80 | 4.02 |

It is very plain that for young pig the rations containing skimmed milk proved superior to those containing the nitrogenous vegetable foods as a substitute. But with the older animals the substitution of pea meal or pea and oat meal for the skimmed milk, wholly or in part, did not materially change the rate of growth or its relation to the digestible food consumed.

In a single case an exception occurs, viz: Period 3 with the Berkshires in the 1892 experiment, where the pure grain ration seemed to check the growth of the pigs. In all other cases the amount of digestible food seems to be the practical measure of efficiency whether its source be animal or vegetable.

## WASTE OF FAT IN SKIMMED MILK BY THE DEEP-SETTING PROCESS.*

W. H. JORDAN AND J. M. BARTLETT.

The relative economy of the various methods of creaming milk is a matter which is just now receiving much attention from Maine dairymen. The question which is most frequently asked, especially by those keeping a fairly large herd of cows, is, "Shall I get a separator?"

In comparing the separator with the cold deep-setting process several points demand consideration:

1st. The relative expenditure of money, time and labor.
2d. The relative waste in the skimmed milk.
3d. The relative waste in the buttermilk.
4th. The comparative quality of the product.

Present knowledge leads to the opinion that the cream can be handled with equal economy from the two methods, and that there is not difference enough between well made separator-cream butter and equally well made cold-setting-cream butter to find any practical recognition in the most particular market.

The first two points, then, are the ones concerning which there is still more or less discussion.

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*The matter presented under this head is prepared to be issued as Bulletin No. 5, second series.

The object of this bulletin is to present certain facts, lately ascertained by the Station, bearing upon the second point. These facts were obtained as follows: A representative of the Station, Mr. Hayes, during a certain part of August, September and October last, accompanied the cream collectors of two butter factories, viz: the Turner Centre Factory and the Poland Factory, on their trips to the houses of the patrons, and thoroughly sampled the skimmed milk from twenty-four hours' milk. These samples, which were kept sweet by means of a preservative, were promptly shipped to the Station laboratory, where the per cent of fat was determined. The Turner Factory patrons were visited between August 24th and September 9th, and the Poland Factory patrons, between September 30th and October 10th. Besides the names and addresses of the patrons, Mr. Hayes noted other data, which, when summarized, give the following figures:

| | |
|---|---|
| No. of farms visited | 224 |
| No of cows then milked | 1,360 |
| Quarts of milk produced | 7,623 |
| No. of herds full-blooded Jerseys | 6 |
| " " " grade Jerseys (occasional full-bloods,) | 167 |
| " " " full-blood Holsteins | 2 |
| " " " grade Holsteins | 1 |
| " " " miscellaneous (mixtures of Jersey and other grades, &c.,) | 52 |
| " " farms using deep setting process | 221 |
| " " " " separator | 1 |
| " " " " shallow pans | 2 |
| " " " with ice constantly in tanks | 194 |
| " " " out of ice | 16 |
| " " " using some ice | 5 |
| " " " no record | 6 |

Doubtless some will remark that neither the number of cows kept nor the yield of milk make a very favorable showing for Maine dairymen. It should be remembered, however, that these farms were visited at a season of the year when there would probably be found more dry cows and more in an advanced stage of lactation than at any other time. Besides, a severe drought rendered the past season a particularly unfavorable one.

In regard to the methods of creaming, it appears that but one separator was found, while 221 out of the 224 farmers are using

the cold deep-setting process. Of these only sixteen are recorded as being out of ice, while one hundred and ninety-four keep ice in the tanks constantly.

The very great prevalence of Jersey blood is another fact worthy of note, showing the tendency of Maine farms, not only towards dairying, but towards a specific purpose, rather than a general purpose cow.

The prevalence of the Jerseys and the almost universal use of ice in the tanks all the time are two conditions very favorable to the best possible results with the deep setting process. The percentages of fat in skimmed milk from the 224 farms are not given here in detail, only a summary.

| | |
|---|---|
| Farms with skimmed milk fat .1 per cent. or below | 41 |
| " " " " " above .1 per cent. and not over .15 per cent. | 67 |
| " " " " " above .15 per cent. and not over .20 per cent | 57 |
| " " " " " .25 per cent. | 19 |
| " " " " " .30 per cent. | 11 |
| " " " " " .35 per cent. | 3 |
| " " " " " .40 per cent. | 6 |
| " " " " " from .5 to .2 per cent | 17 |
| Average amount of fat in 100 lbs. skimmed milk (224 farms) | .239 lbs. |
| Average amount of fat in 100 pounds skimmed milk excluding seventeen farms where the amount was .5 pounds or over (207 farms) | .182 lbs. |
| Average amount of fat in 100 pounds skimmed milk Turner Centre Factory (157 farms) | .188 lbs. |
| Average amount of fat in 100 pounds skimmed milk Poland Factory (66 farms) | .357 lbs. |
| Average for Turner Factory excluding 6 farms over .5 pounds | .168 lbs. |
| Average for Poland Factory excluding 11 farms over .5 pounds | .222 lbs. |

The above figures are certainly somewhat surprising. They are much more favorable to the cold deep setting process than any heretofore published, of which the writer is aware, and somewhat diminish the argument for the separator, in so far as it pertains to the prevention of waste in the skimmed milk. One hundred and sixty-

five of the two hundred and twenty-four herds tested did not exceed .2 per cent. of fat in the skimmed milk, the average being about .15 per cent. By the use of the separator on these farms not over .05 per cent. fat would be saved, or one pound of butter fat to two thousand pounds of skimmed milk, *provided the deep setting process is as successfully used all the time.* It is not claimed that the work of the deep setting process is always as good as this. The facts are stated simply as they are found.

It appears that in seventeen cases the per cent. of skimmed milk fat ranged from .5 to 2. In many instances there appears to be a sufficient cause for this excessive loss. In ten of these cases the supply of ice was exhausted, in one the breed of cows was possibly not adapted to the closest deep-setting creaming, in one instance the cream was taken by "top-skimming" which may easily involve unusual loss, and in five instances the conditions were good, there being no apparent reason for abnormal waste.

### IS IT NECESSARY TO SUBMERGE THE CANS?*

In the use of the Cooley tank and cans in our own private dairy operations, our philosophy has not considered it necessary that the cans be submerged in order to secure the cleanest practicable creaming, care only being taken that the iced water be kept above the height of the milk in the cans. Seeing the statement in one of our exchanges that the dairymen at the Connecticut convention jumped on to the claim made by Professor Jordan, that the submergence was not absolutely necessary to good work, for they had proved to the contrary, we at once applied to Professor Jordan to learn whether experiments conducted by him had shown that we, and others following the same method, were losing cream by such practice. In reply he has kindly furnished data on the matter, which we give to the readers of the *Farmer* for their benefit.

### PROFESSOR JORDAN'S REPLY.

Two reasons are directly or indirectly put forward why submerging should be secured:

1. The composition of the cream is more uniform when this is done.

*The following discussion of this question appeared in the *Maine Farmer* on March 1st, 1894, and as it is a matter closely related to the cold setting process for raising cream, and as the data on which the discussion is based was obtained in connection with that presented on the foregoing pages, the liberty is taken to reprint the *Farmer* article in this connection.

2. Less fat is left in the skimmed milk than otherwise would be the case.

No experimental evidence is at hand to show whether the first claim is in accordance with fact or not. The only possible reason that can be offered, however, why submerging affects the consistency of cream, is that it prevents evaporation and consequent thickening of the surface of the cream. But when the cans are in a closed cabinet, the air over the water must be so saturated with moisture as to preclude evaporation from the cream, even if the cans are not submerged. But this point is scarcely worth arguing, for other unavoidable conditions so influence the composition of cream as to completely overshadow this in effect.

The second claim is the more important, and concerning which a certain amount of data is fortunately available.

As was stated in Bulletin No. 5, just issued from this Station, and published in the *Farmer*, a representative of the Station visited two hundred and twenty-four farms, supplying milk to two creameries, and took samples of the skimmed milk. Among other data he noted the manner of setting the milk, whether ice was in the tanks, whether the cans were submerged or not, and if not, the depth of the water.

In making up the averages presented herewith, it should be stated that the first twenty-five farms are excluded, as no record was made of the depth of the water. There are also excluded a few cases where top skimming was practiced, because uniform conditions should prevail in such a comparison. Again, the cases where no ice was used, or other unfavorable circumstances existed, are not included. With these exceptions, the figures obtained are as follows:

| | |
|---|---|
| Number of observations made | 163 |
| Number with cans submerged or sealed | 124 |
| Number with cans not submerged or sealed | 39 |
| Per cent skimmed milk fat in submerged or sealed cans | .173 |
| Per cent skimmed milk fat in cans not submerged or sealed | .200 |

The difference is slightly in favor of submerging, but is not large enough to have any practical importance.

It is noticeable in looking over the records mentioned in the foregoing, that a greater percentage of Jerseys and Jersey grades were found among the patrons of the Turner factory than among those of

the Poland factory, the latter owning a somewhat larger proportion of Shorthorn and Holstein grades. For this reason it is possibly more just to compare results among the patrons of the same factory, especially as the "not submerged" cases were more frequent in one case than in the other:

TURNER FACTORY.

| | |
|---|---|
| Number patrons with cans submerged or sealed | 106 |
| Number patrons with cans not submerged or sealed | 13 |
| Per cent skimmed milk fat in submerged or sealed cans | .169 |
| Per cent skimmed milk fat in cans not submerged or sealed | .177 |

POLAND FACTORY.

| | |
|---|---|
| Number patrons with cans submerged or sealed | 18 |
| Number patrons with cans not submerged or sealed | 26 |
| Per cent skimmed milk fat in cans submerged or sealed | .201 |
| Per cent skimmed milk fa tin cans not submerged or sealed | .211 |

The records show that where the cans were not submerged or sealed, the depth of water varied from half the height of the can to a level with the handles. Mr. Hayes states that the purpose seemed to be to have the water as high as the milk, or above.

The value of submerging as a means of decreasing the waste of fat in the skimmed milk does not become apparent through the foregoing figures. It should be remembered, however, that in all these cases ice was used and kept in the tanks all the time. If this were not done, the chances would appear to be in favor of submerging, because the greater the volume of water, the less its temperature would be raised by cooling the warm milk.

W. H. JORDAN.

Maine Experiment Station, February 14, 1894.

# REPORT OF THE HORTICULTURIST.

W. M. MUNSON.

Many of the experiments detailed in the following report are repetitions or continuations of those undertaken in previous years. The conclusions reached, though sometimes contradicting those heretofore drawn, are none the less valuable. They are the result of careful study of the problems, and as stated in other connections, conclusions are too often freely drawn from insufficient data.

The cauliflower has been added to the list of vegetables receiving special attention, and our success, from a practical point of view, would indicate that the crop may be profitably grown in this section of the state.

The fruit plantation is not as yet in full bearing, and notes concerning the comparative merits of varieties are reserved for a future report. Several additions were made to the orchard, also to the collection of small fruits, during the past season. Despite the cold winter of 1892-3, very little damage was noticed in our plantations.

Spraying experiments were continued on the lines detailed in my last report. The results obtained, as heretofore, point strongly to the value of the use of the copper solutions in combatting the apple scab. The most valuable preparation yet used is the Bordeaux mixture. We are under special obligations to Mr. Charles S. Pope of Manchester, for the continued use of his orchard and the careful attention given in carrying into effect the instructions of the writer.

Included in this report is a catalogue of the fruits of the state with the approximate value of each. This catalogue is presented only after careful study of the reports of many of the leading fruit growers in different sections of the state, in response to a series of questions sent out by the writer. It will be found valuable for reference in the selection of fruits for general planting.

I wish to make special mention of the careful and efficient work of my assistant, H. P. Gould.

## 1—NOTES OF CABBAGES.

As heretofore our work with cabbages was confined to a few questions relative to methods of culture. In all cases the seed was sown in the forcing house April 3d, and the young plants were pricked out

into boxes April 24th. The season was exceptionally late and a second handling was necessary, May 17th, before the final transfer to the field May 30th.

"All Head Early" and "Burpee's Safe Crop," two sorts sent for trial by W. Attee Burpee & Co., of Philadelphia, are of the Flat Dutch type. They did not average quite so large nor so early as Early Flat Dutch, but were very uniform in size, of firm texture, and produced a high percentage of marketable heads.

1. *Influence of Transplanting*: For two seasons an experiment has been conducted for the purpose of ascertaining whether plants handled in pots previous to setting in the field, are enough superior to those handled in boxes, to warrant the increased expense.* In 1891 the results were indifferent, while last year indications were strongly in favor of the pot-grown plants. The treatment of the plants was in every respect similar to that given last season, *i. e.* one lot of twenty-five young plants was transferred from the seed flat to three-inch and later to four-inch pots, while a duplicate lot was placed in shallow boxes—two inches apart at the first handling and four inches apart at the second.

The results obtained are shown in table I.

TABLE I.

CABBAGE PLANTS FROM POTS AND BOXES.

| VARIETY AND TREATMENT. | Heaviest head—lbs. | Lightest head—lbs. | Average weight—lbs. | Number of heads cracked. | Number of heads immature. | Failed to head. | Ratio. | Remarks. |
|---|---|---|---|---|---|---|---|---|
| FLAT DUTCH. | | | | | | | | |
| Pots | 15.2 | 8.9 | **10.7** | 3 | 0 | 0 | **1.23** | All cut Aug. 18 |
| Boxes | 12.0 | 2.9 | **8.7** | 0 | 1 | 2 | **1.00** | |
| SAFE CROP. | | | | | | | | |
| Pots | 10.0 | 5.5 | **7.4** | 0 | 0 | 1 | **1.34** | |
| Boxes | 9.2 | 2.4 | **4.9** | 0 | 11 | 2 | **1.00** | |
| ALL-HEAD EARLY. | | | | | | | | |
| Pots | 12.0 | 2.8 | **8.3** | 1 | 0 | 0 | **1.60** | |
| Boxes | 8.0 | 1.1 | **5.2** | 0 | 1 | 0 | **1.00** | |

*Report Maine Experiment Station, 1891, p. 84; 1892, p. 61.

As will be seen at a glance plants handled in pots were, in every respect, superior to those from the boxes; thus confirming results obtained last year. In no case did the plants from boxes produce heads equal to the best of those from pots.

*Conclusion*: The practice of handling cabbage plants in pots previous to setting in the field would seem to be warranted by the results obtained during the past two seasons.

2. *Effects of Trimming*: A test as to the value of the practice of reducing the amount of foliage at time of setting was conducted along the same lines as last season.* The results as shown by table II are almost identical with those obtained in the previous trial.

TABLE II.

EFFECTS OF TRIMMING.

| VARIETY. | Number of heads. | Heaviest head—lbs. | Lightest head—lbs. | Average weight—lbs. | Number of heads cracked. | Number of heads immature. | Number of plants not cut. | Ratio. | Date of harvesting. |
|---|---|---|---|---|---|---|---|---|---|
| EARLY SUMMER. | | | | | | | | | |
| Trimmed..... | 9 | 10.0 | 4.0 | **7.9** | 4 | 2 | 1 | **1.23** | Sept. 1. |
| Not trimmed..... | 8 | 9.4 | 3.1 | **6.4** | 2 | 2 | 1 | **1.00** | Sept. 1. |
| WORLD BEATER (Brill). | | | | | | | | | |
| Trimmed..... | 7 | 13.3 | 6.9 | **9.5** | 1 | 0 | 1 | **1.00** | Sept. 12. |
| Not trimmed..... | 7 | 14.7 | 3.5 | **9.5** | 2 | 1 | 1 | **1.00** | Sept. 12. |
| WORLD BEATER (Burpee). | | | | | | | | | |
| Trimmed..... | 19 | 15.7 | 3.3 | **9.9** | 0 | 0 | 2 | **1.00** | Sept. 12. |
| Not trimmed..... | 13 | 16.0 | 6.2 | **11.1** | 3 | 0 | 1 | **1.12** | Sept. 12. |

As will be observed, the results are almost negative. The first variety, Early Summer, exactly reverses the result given last season, when the ratio was as 1.00:1.23 in favor of plants not trimmed. In case of World Beater (Brill) the ratio was neutral as in 1892. The plants used in this test were from the same lot of seed as those grown last year. The third variety gave results slightly in favor of plants not trimmed.

*Report Maine Experiment Station 1892, p. 60.

*Conclusion:* The results of two seasons' work indicate that little advantage is derived from the practice of trimming cabbage plants at time of setting.

3. *Holding Plants in Check*: Frequently, because of an unusually late season, or from other unavoidable circumstances growers are unable to set plants in the field as soon as they might desire, or when the plants are ready for the transfer. Such conditions existed in our own experience the present year and to meet the case in hand, at the last handling in the house, May 17, all plants except some for checks were severely headed back. What the usual result might be of course we are unable to say, but indications are certainly favorable to the practice. Our general crop was uniformly good. The results of careful comparison of plants thus treated with others of the same lots not checked are given in table III.

TABLE III.

CHECKING GROWTH.

| VARIETY. | Heaviest head—lbs. | Lightest head—lbs. | Average weight—lbs. | Number of heads cracked. | Number of heads immature. | Number of heads not cut. | Ratio. | Date of harvesting. |
|---|---|---|---|---|---|---|---|---|
| ALL HEAD (Burpee's). | | | | | | | | |
| Checked | 12.0 | 2.8 | **8.3** | 1 | 0 | 0 | **1.14** | August 18. |
| Not checked | 11.6 | 3.3 | **7.3** | 0 | 0 | 0 | **1.00** | August 18. |
| FLAT DUTCH. | | | | | | | | |
| Checked | 15.2 | 8.9 | **10.7** | 3 | 0 | 0 | **1.09** | August 19. |
| Not checked | 13.2 | 5.6 | **9.8** | 1 | 0 | 0 | **1.00** | August 19. |
| SAFE CROP (Burpee's). | | | | | | | | |
| Checked | 10.0 | 5.5 | **7.4** | 0 | 0 | 1 | **1.00** | August 18. |
| Not checked | 10.2 | 6.4 | **8.6** | 0 | 0 | 1 | **1.16** | August 18. |
| RED. | | | | | | | | |
| Checked | 13.2 | 5.3 | **8.0** | 2 | 0 | 1 | **1.13** | September 12. |
| Not checked | 11.3 | 1.3 | **7.1** | 1 | 2 | 0 | **1.00** | September 12. |

In most cases plants headed back at the last transplanting in the house were superior to those not thus checked. They were uniformly earlier, and were as a rule slightly larger. It is probable that

the time elapsing between the check and the transfer to the field allowed the plants to recuperate and make a sturdy growth; while plants not treated were necessarily more or less drawn and not in as good condition for the final transfer.

*Conclusion*: Cabbage plants likely to become drawn and crowded before planting out, appear to be benefited by severe pruning of the foliage.

## II—Notes of Cauliflowers.

The cauliflower is a vegetable highly prized by many, but is too seldom met in the home gardens of our State. Possessing many of the good qualities of the cabbage it is, to a certain extent lacking in the peculiar rank flavor which renders the former disagreeable to many people. The delicate qualities of the cauliflower are, however, frequently disguised or lost through failure of the housewife to familiarize herself with the best methods of serving. For this reason we have given below some notes concerning the cooking of cauliflowers, condensed from material kindly furnished by Miss Anna Barrows, School of Domestic Science, Boston.

1. *Directions for Serving the Cauliflower:* A cabbage or cauliflower, unless taken directly from the garden is much improved if so placed that it can absorb water through its stalk for twelve to twenty-four hours before cooking. Soak a cauliflower, head down, in cold salted water for an hour before cooking to draw out any insects that may be concealed. A small cauliflower may be cooked whole and should be placed in the kettle with the flowerets up as the stalk needs the most thorough cooking; a large head should be divided into six or eight pieces.

Cook in a kettle of rapidly boiling salted water, to which may be added one-fourth of a level teaspoonful of soda. (The soda aids in softening the woody fibre.) The kettle should be skimmed occasionally while the vegetable is cooking, or, to save trouble, some prefer tying the cauliflower in a thin cloth. An agate or porcelain lined kettle is preferable to iron, which is likely to discolor the cauliflower.

The odor is less noticeable if the kettle is left uncovered. The water may also be changed to dispel the odor. A cauliflower should be tender after twenty to thirty minutes of rapid boiling. If overcooked it appears soggy and water-logged.

A good cauliflower, well cooked, requires little additional flavor beside salt and good butter. Some, however, prefer the addition of grated cheese. The cauliflower may also be served as a garnish for meats, in sauces, soups and is excellent cold as a salad. Many prefer it with a thick cream sauce.

"Cold boiled cauliflower is very good fried plain in butter, or breaded and fried, or mashed and fried like oyster plant, with the addition of an egg and a palatable seasoning of salt and pepper."

The last paragraph is from Miss Carson's Practical American Cookery. Many other hints may be obtained from this and other leading guides to cookery.

2. *Culture*: In a general way the culture is the same as for cabbages. Early varieties should be started in the house or hot-bed as soon as the first of April. Handle as needed, and set in the open field as early as possible. The best soil is a rich, moist loam, but it should be well drained. Like the cabbage, the cauliflower is a gross feeder and demands intense culture. If growth is stopped from any cause, the heads are likely to "button" or form small sections interspersed with leaves, worthless for market purposes. Frequent cultivation is necessary, and it is probable that in case of very dry weather about the time of heading, irrigation would be a profitable means of securing a crop for home use at least. When the heads are about three inches across, the outer leaves should be brought together and held in place by means of a piece of twine or raffia, that the heads may be well bleached.

3. *Influence of Early Treatment*: The relative influence of pot and of box culture of young plants was considered with reference to the number of heads produced: Seed was sown April 3d; the young plants were transferred to two and one-half inch pots April 24th; to four inch pots May 10th, and to the field May 29th. A duplicate lot was handled in boxes at the same dates. At the last handling in the house, May 10th, the leaf surface was reduced about one-half. A tabular view of the results is given below:

TABLE IV,

CAULIFLOWERS IN POTS AND BOXES.

| VARIETY. | Number heads cut July 26. | Number heads cut August 3. | Number heads cut August 15. | Number heads cut August 28. | Total number heads. | Number of plants. | Per cent of plants forming heads. |
|---|---|---|---|---|---|---|---|
| DWARF FRENCH, Half Early Dwarf French. | | | | | | | |
| Pots | 1 | 4 | 1 | 0 | 6 | 13 | **46.2** |
| Boxes | 0 | 4 | 1 | 0 | 5 | 21 | **23.8** |
| GILT EDGE (Thorburn). | | | | | | | |
| Pots | 4 | 9 | 2 | 1 | 16 | 17 | **94.5** |
| Boxes | 2 | 7 | 2 | 1 | 12 | 16 | **75.0** |
| PARIS, Extra Early Paris. | | | | | | | |
| Pots | 2 | 1 | 0 | 0 | 3 | 17 | **17.6** |
| Boxes | 0 | 0 | 2 | 1 | 3 | 17 | **17.6** |
| LONDON, Large Early London. | | | | | | | |
| Pots | 0 | 0 | 1 | 10 | 11 | 20 | **55.0** |
| Boxes | 0 | 0 | 3 | 10 | 13 | 21 | **61.9** |

In two instances there was a difference of twenty per cent in favor of the plants grown in pots. One variety gave the same number of heads in each case but the plants from pots were two to three weeks earlier than the others. The fourth variety gave a slight difference, about seven per cent, in favor of the box treatment. Doubtless any benefit that might arise from handling plants in pots would lie in the fact that the plants are kept at a more uniform rate of growth.

*Conclusion:* Indications point to an increased percentage of marketable heads as a result of handling cauliflower plants in pots during early stages of growth.

4. *Effects of Trimming:* The value of reducing the amount of foliage at the time of removal to the field with reference to the heading of cauliflower, received some attention. The seed was sown April 3, the young plants were transferred to boxes April 24 and again May 10. All were removed to the field May 29, when the foliage of one lot was reduced by one-half while a duplicate lot was left without trimming.

The table shows the relative earliness and the per cent of heads formed.

TABLE V.

EFFECT OF TRIMMING CAULIFLOWERS.

| VARIETY. | Number heads cut July 26. | Number heads cut August 3. | Number heads cut August 16. | Number heads cut August 28. | Number heads cut September 15. | Total number heads. | Number of plants. | Per cent of plants forming heads. |
|---|---|---|---|---|---|---|---|---|
| ALABASTER. | | | | | | | | |
| Trimmed | 3 | 4 | 1 | 2 | – | 10 | 12 | **83.3** |
| Not trimmed | 4 | 5 | 2 | – | – | 11 | 12 | **91.7** |
| ERFURT (Large Early Dwarf). | | | | | | | | |
| Trimmed | – | 5 | 4 | 1 | – | 10 | 13 | **76.9** |
| Not trimmed | – | 7 | 3 | 1 | – | 11 | 13 | **84.6** |
| ERFURT (Ordinary). | | | | | | | | |
| Trimmed | – | 4 | 7 | 6 | – | 17 | 19 | **89.5** |
| Not trimmed | – | 7 | 3 | 7 | 1 | 18 | 19 | **94.7** |
| PRIZE EARLIEST. | | | | | | | | |
| Trimmed | – | 4 | 2 | 4 | – | 10 | 14 | **71.4** |
| Not trimmed | – | – | 5 | 4 | – | 9 | 13 | **69.2** |
| STADTHOLDER. | | | | | | | | |
| Trimmed | – | – | – | 3 | 2 | 5 | 10 | **50.0** |
| Not trimmed | – | – | – | 3 | – | 3 | 9 | **33.3** |

As a rule, the per cent of heads formed was greater from plants not trimmed. There was practically no difference in the earliness of the two lots, nor was there a marked difference in the size of the heads.

*Conclusion*: Results obtained will not warrant us in commending the practice of trimming cauliflower plants severely at time of setting in the field.

5. *Varieties:* Nearly all of the more important varieties of cauliflower were grown in our gardens the past season for purposes of comparison. We found, as was expected, a marked variation in different strains of the same type. The accompanying table will give a comprehensive view of the comparative merits of the different strains and varieties as regards earliness, percentage of heads formed, and average weight of heads. The latter quality is necessarily only relative; for a few days time, even after the head is ready for market makes a decided difference in weight.

TABLE VI.

VARIETIES OF CAULIFLOWER.

| VARIETY. | Number heads cut July 26. | Number cut August 3. | Number cut August 15. | Number heads August 28. | Number heads September 15. | Number heads after October 1st. | Total number heads cut. | Number of plants. | Per cent of plants forming heads. | Average weight per head—lbs. |
|---|---|---|---|---|---|---|---|---|---|---|
| Autumn Giant | – | – | – | 1 | 2 | 2 | 5 | 14 | **35.7** | 9.7 |
| Best Early (Burpee's) | 8 | 4 | 2 | – | – | – | 14 | 14 | **100.0** | 1.9 |
| Dwart Erfurt, extra early | 3 | 3 | 5 | 1 | – | – | 12 | 12 | **100.0** | 2.8 |
| Dwarf Erfurt, ordinary | – | 7 | 3 | 7 | 1 | – | 18 | 19 | **94.7** | 3.7 |
| Early Alabaster | 4 | 5 | 2 | – | – | – | 11 | 12 | **91.7** | 1.3 |
| Early Dwarf Danish | 7 | 12 | 1 | – | – | – | 20 | 20 | **100.0** | 2.7 |
| Early Paris | – | 2 | 5 | 3 | – | – | 10 | 13 | **76.9** | 2.7 |
| Early Asiatic | – | 2 | 5 | 3 | 1 | – | 11 | 11 | **100.0** | 3.3 |
| Early London | – | – | 3 | 10 | – | – | 13 | 21 | **61.9** | 3.9 |
| Extra Early Paris | – | – | 2 | 1 | – | – | 3 | 17 | **17.6** | 0.9 |
| Giant Purple, early | – | – | – | 1 | 2 | 2 | 5 | 15 | **33.3** | 4.8 |
| Giant Purple, late | – | – | – | 1 | 2 | 1 | 4 | 16 | **25.0** | 7.9 |
| Half Early Dwarf French | – | 4 | 1 | – | – | – | 5 | 21 | **23.8** | 1.5 |
| Imperial | 1 | 6 | 2 | 1 | – | – | 10 | 11 | **90.9** | 2.6 |
| Italian Taranto | – | – | – | 1 | 3 | – | 4 | 22 | **18.2** | 6.9 |
| Kronk's Perfection | 7 | 5 | 3 | 1 | – | – | 16 | 16 | **100.0** | 2.2 |
| Landrettis First | – | 16 | 3 | 1 | – | – | 20 | 20 | **100.0** | 3.3 |
| Large Late Dutch | – | – | – | 2 | 1 | – | 3 | 24 | **12.5** | 6.0 |
| Large Algiers | – | – | 4 | 3 | – | – | 7 | 14 | **50.0** | 2.6 |
| Large Early Dwarf Erfurt | – | 7 | 3 | 1 | – | – | 11 | 13 | **84.6** | 2.0 |
| Lenormand's Short Stem | 1 | – | 4 | 1 | – | – | 6 | 18 | **33.3** | 1.1 |
| Livingston's Earliest | 8 | 4 | 1 | 1 | – | – | 14 | 18 | **77.8** | 3.2 |
| Long Island Beauty | – | 8 | 7 | – | – | – | 15 | 15 | **100.0** | 2.3 |
| Nonpareil | – | – | 4 | 5 | 1 | – | 10 | 15 | **66.7** | 3.0 |
| Prize Earliest | – | – | 5 | 4 | – | – | 9 | 13 | **69.2** | 3.2 |
| Stadtholder | – | – | – | 3 | – | – | 3 | 9 | **33.3** | 5.0 |
| Thorburn Early Snowball | 2 | 4 | 2 | 3 | – | – | 11 | 14 | **78.6** | 2.2 |
| Thorburn Gilt Edge | 2 | 7 | 2 | 1 | – | – | 12 | 16 | **75.0** | 0.6 |
| Vaughan's Danish Snowball | 2 | 7 | 2 | 1 | – | – | 12 | 12 | **100.0** | |
| Walcheren | – | – | – | 2 | – | – | 2 | 10 | **20.0** | 2.6 |

As will be seen, nearly all of the earliest varieties produced a high percentage of marketable heads, while the later sorts were anything but satisfactory. Of the whole number of varieties grown sixteen produced more than seventy-five per cent of marketable heads, while with eight varieties, every plant produced a good head. The earliest varieties were Burpee's Best Early, Dwarf Danish, Kronk's Perfection, and Livingston's Earliest. These were closely followed by Alabaster, Landreth's First, Long Island Beauty and several strains of Snowball.

Most of the late varieties were checked by the dry weather and showed a tendency to "button," or go to seed, hence are not considered here.

The following field notes concerning the more important varieties were made

*Alabaster*: (Johnson & Stokes).—Said to be a sport from *Dwarf Erfurt* (see below). A small early variety. An erect grower and may be planted closely.

*Autumn Giant*: (Thorburn).—A very large late variety of excellent quality; should not be started so early as most other sorts.

*Best Early*: (*Burpee's Best Early*, Burpee).—Small, but one of the earliest and surest heading varieties.

*Dwarf Erfurt*: (Thorburn).—Takes its name from the city of Erfurt, Germany, where cauliflowers are extensively grown. One of the most popular early varieties Several strains were grown this year, of which the best seemed to be Thorburn's Extra Early.

*Early Danish*: (Farquhar).—Of the Erfurt type; forming a medium sized head, very firm and good. One of the best.

*Early Paris* (Thorburn, Farquhar).—Moderately vigorous, with long stem and of spreading habit. Leaves covered with heavy bluish white bloom giving the variety a characteristic light shade. Heads of fair size but lacking in solidity.

*Giant Purple.* (Childs).—A large, late variety, very attractive when growing, and of excellent flavor, but when served its color is objectionable.

*Imperial.* (Landreth).—A medium sized pure white variety. Of spreading habit and heads not very firm.

*Kronk's Perfection.* (Farquhar).—A very fine strain of the Erfurt type. Of medium size, early, uniform, and in our plantation was among the best.

*Landreth First.* (Landreth).—Of vigorous, erect habit, but having a short stem. Heads of medium size, very solid, white, and rather remarkable for uniformity. One of the best.

*Livingston's Earliest.* (Livingston).—One of the earliest, small but uniform in date of maturity, a valuable consideration in a market variety.

*Long Island Beauty.* (Gregory).—A valuable second early sort. Only two cuttings were necessary and every plant produced a marketable head.

*Prize Earliest.* (Maule).—Three weeks later than some of the other varieties. Not satisfactory this season.

*Snowball.* (*Early Snowball*, Thorburn).—A moderately vigorous variety forming small but very solid heads. From this type many valuable strains have been derived. One of the most valuable of these is the next mentioned.

*Thorburn Gilt Edge.* (Thorburn) —This variety is not quite so vigorous as the parent, the leaves are slightly smaller and very dense, while the stem is shorter. Heads small but handsome, and usually one of the most reliable.

*Vaughan's Danish Snowball.* (Vaughan).—Differs little in habit from Snowball described above. Very early and apparently a sure header.

London, Italian Taranto, Late Dutch, Algiers, Nonpariel, Stadtholder and some others while producing very good individual heads, were not reliable, the present season, and notes concerning these are withheld until further trial.

## Summary.

1. The general treatment of the cauliflower is similar to that required by cabbages. Thorough and frequent cultivation are essential.

2. Handling plants in pots before setting in the field increased the percentage of marketable heads.

3. Trimming plants at time of setting is of doubtful value.

4. Early varieties are, as a rule, more certain to produce a satisfactory crop than are the late sorts.

5. The earliest varieties grown the past season were: Burpee's Best Early, Dwarf Danish, Kronk's Perfection and Livingston's Earliest; closely followed by Alabaster, Landreth's First, Long Island Beauty and several strains of Snowball. All of these produced a high percentage of marketable heads.

## III—Notes of Tomatoes.

As heretofore, special attention was given to methods of culture rather than to a multiplicity of varieties. Many of the experiments undertaken last season were repeated, for as before stated, positive conclusions can not be drawn from a single season's work.

1. *Effects of Early Setting*: A dozen plants of each of three varieties were used in the test. All were given similar treatment in the house. The first lot was removed to the field May 23d The other a week later Owing to a heavy frost on the night of May 27th the early set plants were severely checked; while the weather for some days was cold and raw, but very dry. In spite of this check the first lot recuperated and by the first of October there was practically no difference in the two lots.

Table VII gives an exact statement of the results:

TABLE VII.

EFFECT OF EARLY SETTING.

| Variety. | Date of first ripe fruit. | Average number fruits per plant. | Average weight of fruit per plant—pounds. | Average weight of individual fruits—ounces. | Number fruits per plant before October 1st. | Number decayed fruits per plant before October 1st. | Total number decayed fruit per plant. |
|---|---|---|---|---|---|---|---|
| Buckeye State. | | | | | | | |
| First setting | Aug. 9.. | 11.0 | 6.4 | 9.3 | **6.4** | 1.3 | **5.8** |
| Second setting | Aug. 10.. | 8.6 | 5.3 | 10.0 | **5.7** | 2.0 | **4.5** |
| Burpee's Climax. | | | | | | | |
| First setting | Aug. 4.. | 27.3 | 8.4 | 4.9 | **19.8** | 1.4 | 7.3 |
| Second setting | Aug. 2.. | 33.6 | 10.4 | 4.9 | **20.8** | 1.2 | 10.6 |
| Great B. B. | | | | | | | |
| First setting | Aug. 27.. | 23.9 | 8.6 | 5.8 | **13.9** | 1.3 | 9.8 |
| Second setting | July 27.. | 29.5 | 11.0 | 6.0 | **13.4** | 1.9 | 15.5 |

There was very little difference in the time of ripening of the first fruits; and on the first of October, a date as late as can usually be relied on for tomatoes, there was practically no difference in the number of fruits produced by the two lots. The slight variation found was in favor of the early set plants.

As will be see by the last two columns in the table, the number of decayed fruits was very greatly increased late in the season, amounting in some cases to 75 per cent. of the fruit gathered.

*Conclusion*: While not so marked as in previous trials, indications still point to the value of early setting of tomato plants.

2. *Value of Pot-Culture*: The importance of careful handling of tomato plants has been emphasized in previous reports, and a limited amount of work has been done in this direction at this station.

During the past season a test of the relative value of pot-culture during the early stages of growth was conducted on lines similar to those detailed on page 102 for cabbage plants. A dozen plants of each of four varieties were transferred from the seed-flats to thumb-pots on April 27th, to three-inch pots May 9th, to four-inch pots May 20th, and to the open ground June 1st A duplicate lot was handled in flats at the same time. The results are shown in table VIII.

TABLE VIII.

VALUE OF POT CULTURE OF TOMATOES.

| VARIETY. | Average number fruit per plant. | Average weight of fruit per plant—pounds. | Average weight of individual fruits—ounces. | Average number fruits per plant before October 1st. | Ratio (by number of fruit.) | Bushels per acre, before October 1st. |
|---|---|---|---|---|---|---|
| IGNOTUM. | | | | | | |
| Pots | 19.0 | 8.9 | 7.5 | **10.5** | **1.28** | **139.4** |
| Boxes | 12.3 | 5.9 | 7.7 | **8.2** | **1.00** | **110.3** |
| ITHACA. | | | | | | |
| Pots | 23.5 | 6.7 | 4.6 | **15.8** | **1.42** | **127.8** |
| Boxes | 15.5 | 4.7 | 4.0 | **11.1** | **1.00** | **98.7** |
| OPTIMUS. | | | | | | |
| Pots | 32.0 | 7.9 | 3.9 | **14.2** | **1.21** | **112.1** |
| Boxes | 16.5 | 4.3 | 4.2 | **11.7** | **1.00** | **83.0** |
| STONE. | | | | | | |
| Pots | 14.3 | 5.5 | 6.2 | **7.4** | **1.39** | **72.6** |
| Boxes | 9.1 | 5.1 | 8.2 | **5.3** | **1.00** | **81.3** |

In every instance there was a marked increase in the number of fruits from plants handled in pots, and in the total weight of fruit produced. It will be observed, however, that the individual fruits averaged larger on the plants from boxes. This fact is no doubt due to the smaller numbers borne, as before mentioned.

In the last column is given the number of bushels per acre before October 1st, on the basis of the weight of fruit picked at that time, and considering the plants placed five feet apart each way in the field. With one variety the difference is slightly (about 9 bushels per acre) in favor of the box culture. This difference being due to the marked increase in size. But the first three varieties show a difference of more than 29 bushels each, in favor of the pot-grown plants. This difference, at 75 cents per bushel (none of our fruit was sold at less than 60 cents per bushel, and early in the season we received $1.75 at wholesale), would amount to $21.83 per acre, —a sum that would far more than pay for the cost of pots and the slightly increased cost of handling in the house.

*Conclusion*: There appears to be a marked increase in the productiveness of plants handled in pots previous to setting in the field.

3. *Individual Variation*: The danger from drawing too free conclusions from a single season's work was suggested last year, when it was found that, "In no case were the results from duplicate tests uniform."* A similar test of the variation of duplicate lots of any given variety was conducted the past season. The results bear out our former conclusion to such an extent that results of certain methods of culture undertaken are withheld for further verification.

Table IX shows the comparative results obtained with duplicate lots of each of three varieties, all of which were given the same treatment in house and field.

*Report Maine Experiment Station, 1892, page 64.

TABLE IX.

INDIVIDUAL VARIATION.

| VARIETY. | Average number fruits per plant. | Average weight of fruit per plant—lbs. | Average weight of individual fruits—ounces. | Average number decayed fruits per plant. | Date of first ripe fruit. |
|---|---|---|---|---|---|
| GOLDEN QUEEN | **13.9** | 4.5 | **5.2** | 4.9 | August 2. |
| | **19.0** | 6.6 | **5.5** | 5.3 | August 9. |
| ROSE PEACH | **16.6** | 3.2 | **3.1** | 2.3 | August 7. |
| | **13.1** | 2.4 | **3.0** | 2.7 | August 7. |
| ROYAL RED | **14.4** | 5.6 | **6.2** | 6.3 | August 7. |
| | **15.0** | 5.8 | **6.1** | 6.7 | August 4. |

The weight of individual fruits was practically uniform, but the variation in number of fruits and in the consequent weight of the product was very marked. The date of ripening was also variable.

*Conclusion*: The individual variation of plants of any given sort is often such as to obscure any effects of different methods of culture. Results previously obtained are confirmed.

4. *Crossing*: Some of our work in developing a tomato which shall be of sufficient earliness to be profitable as a market crop in those sections where the seasons are short, was detailed in our last annual report.* Selections and further crosses were made the present season with interesting and promising results.

The *Lorillard-Peach* cross showed a less marked increase over the pure Lorillard, in number of fruits than was the case in the first generation,—a fact which illustrates the principle frequently laid down that crossing within the limits of the species tends to promote fruitfulness. In the second generation the influence of the male parent on the character of the fruit was shown by several individuals which assumed the peculiar rough skin, and to a certain extent the form of Peach.

*Report Maine Experiment Station, 1892, p. 65.

The *Ignotum-Peach* cross showed a similar falling off in the second generation, as shown below.

| IGNOTUM × PEACH. | Average number fruits per plant (both ripe and green.) | Average weight of fruit per plant—pounds. | Average weight of individual fruits—ounces. | Average number fruits ripened. |
|---|---|---|---|---|
| First generation | **191** | 30.3 | 2.5 | **51** |
| Second generation | **107** | 17.4 | 2.6 | **35** |

As will be seen there is a falling off of nearly forty-four per cent in the total number of fruits borne. It is however quite possible that the conditions under which the parents were grown in the two generations may account for some of this variation.

The original parent was grown in the house and was specially cared for. The plants from which the "second generation" in this trial came, were given ordinary field culture, though the ground was rich and the plants were well cared for.

We know that conditions of growth during a single generation, exert a marked effect on the vitality of seeds. This influence, extending further in the life history of the plant, may determine to a certain extent the character of any strain. In this way it would seem possible that by forcing plants to early development in the house and by limiting the amount of fruit borne for a few generations, a strain of unusual vigor may be produced. This question is receiving attention in our houses at the present time.

The result obtained from crossing the *Lorillard-Currant* hybrid described in our last report,* with the female parent—Lorillard—promises valuable results. Naturally the number of fruits is reduced, but the size is fully doubled, while the quality is much improved.

5. *Varieties*: The tomatoes were started in the forcing house March 27th. All varieties were given the same treatment while in the house and were transferred to the open field June 1st. The first ripe fruits were found July 25th, on Golden Ball and Long Keeper. Two days later one or more fruits were gathered from Aristocrat, Great B. B., Ithaca and Maule's Earliest.

*Report Maine Experiment Station, 1892, page 68.

On October 1st, when the season was practically ended, the following varieties were found in the order named, to have been the most productive: Golden Ball, Improved Peach, Maule's Earliest, Burpee's Climax, Lorillard, Ithaca and Belmont. Optimus, which was the most productive sort grown last year stood *ninth* (or dropping the first two varieties which are of value for amateur culture only, *seventh*) in the list the present season.

The large late varieties, such as Belmont, Buckeye State and Stone, decayed very badly late in the season. The same is true to a certain extent of Ignotum, Matchless and Optimus.

Maule's Earliest and Burpee's Climax were both much smoother than is usual with very early sorts, and are promising.

Ithaca and Long Keeper deserve the credit given in previous reports.

Lemon Blush failed to blush and was consequently inferior to Golden Queen.

Buckeye State, Royal Red and Stone, while of merit as individual fruits, are all too late for our short seasons. Ponderosa will be discarded for similar reasons.

Terra Cotta was of very unsatisfactory quality, and is not a firmly fixed variety.

Great B. B., in spite of its name is a fairly good variety. It decayed badly late in the season.

## Summary.

1 The conclusions of former years as to the value of setting tomato plants as early in the spring as possible are confirmed.

2. Plants handled in pots previous to setting in the field are more vigorous and productive than those not so handled,—a fact which may be of great importance to the commercial grower.

3. Individual variation is often such as to render the work of any one season unreliable.

4. The productiveness of any given variety may be largely increased by crossing with some of the smaller less valuable sorts. But this increased productiveness may be partially or wholly lost in a few years even if good culture is given. The variety will quickly "run out."

5. It seems possible that seeds from plants grown under high culture in the house may give better results than those from plants not so treated.

6. By combining the Lorillard-Currant hybrid, with the Lorillard, the size has been more than doubled, and the quality is much improved.

7. Of the newer varieties, Burpee's Climax, Maule's Earliest and "B. B." were among the most promising. Buckeye State, Ponderosa, Royal Red and Stone are too late for our climate. Lemon Blush lacked its distinguishing characteristic, and Terra Cotta was of inferior quality.

## IV—Notes of Egg Plants.

Our work with egg plants during the past season has been principally confined to methods of culture, including time of setting; deep and surface cultivation; the value of frequent cultivation, the effect of root pruning. In all cases seed was sown March 17. The young plants were pricked out into seed flats April 28; transferred to 4-inch pots May 22, and with the exception of one lot, to the open field June 10.

1. *Value of Early Setting*: The egg plant, being of tropical origin, is very sensitive to sudden changes of temperature. The question has therefore arisen: Will not plants give more satisfactory results if allowed to remain in the house till the season is well advanced, provided they are not checked or crowded?

The writer has usually advocated setting plants about the 10th to the 15th of June, but as bearing upon this point two lots of each of three varieties were given similar treatment during the season, save that one lot was set in the field June 10, and the other June 21, the season being unusually late. The comparative results are shown in table X.

TABLE X.

EARLY *vs.* LATE SETTING OF EGG PLANTS.

| VARIETY. | Number of plants. | Number of plants bearing marketable fruits. | Number of marketable fruit. | Per cent of plants bearing marketable fruit. |
|---|---|---|---|---|
| EARLY DWARF PURPLE. | | | | |
| Early set | 18 | 18 | **40** | **100.0** |
| Late set | 15 | 13 | **15** | **86.7** |
| EARLY LONG PURPLE. | | | | |
| Early set | 17 | 12 | **30** | **70.6** |
| Late set | 16 | 10 | **17** | **62.5** |
| BLACK PEKIN. | | | | |
| Early set | 18 | 18 | **21** | **100.0** |
| Late set | 17 | 11 | **12** | **64.7** |

It will be observed that in every instance the lot set June 10, produced a larger percentage of plants bearing marketable fruits than did the lot set later. This difference in one case—Black Pekin—amounted to more than 35 per cent. The average number of marketable fruits on the bearing plants was also much larger from those set early. Dwarf Purple produced nearly twice as many fruits from the first lot as from the others.

This difference is due to two causes. Fruits seem to set more freely in the warm days of July and August—hence the desirability of having the plants in full vigorous growth at that time; while the fruits formed later are almost certain to be injured by frost before reaching edible maturity.

*Conclusion*: The percentage of plants bearing marketable fruits, also the productiveness of individual plants, is considerably less from plants set late in June than from those set earlier.

2. *Deep vs. Shallow Cultivation*: We have always recommended constant cultivation as one of the first requisites to success with egg plants. There is a question, however, whether it is advisable to disturb the roots to so great a depth as is commonly done with the ordinary farm cultivator. As bearing upon this point a

number of plants of each of three varieties were given ordinary deep cultivation, while a duplicate lot, planted by the side of the first was given very shallow cultivation. The first lot was cultivated about once in ten days with a Planet Jr. horse hoe; the second was hoed by hand at the same time.

The results obtained are shown in table XI.

TABLE XI.

DEEP *vs.* SHALLOW CULTIVATION OF EGG PLANTS.

| VARIETY. | Number of plants. | Number of plants bearing marketable fruit. | Number marketable fruits. | Per cent of plants bearing marketable fruit. |
|---|---|---|---|---|
| ROUND WHITE. | | | | |
| Deep | 11 | 10 | 17 | **90.9** |
| Shallow | 15 | 10 | 14 | **66.7** |
| CREOLE. | | | | |
| Deep | 13 | 7 | 9 | **53.8** |
| Shallow | 12 | 2 | 2 | **16.7** |
| NEW YORK IMPROVED. | | | | |
| Deep | 14 | 5 | 5 | **35.7** |
| Shallow | 15 | 6 | 7 | **46.7** |

As will be observed Creole and Round White were much more productive when deep cultivation was practiced. New York Improved was very unproductive in both cases, but the plants given surface cultivation were slightly the more productive. The season was very dry and it is probable the chief advantage of the deep cultivation was in driving the feeding roots downward, the lose earth above forming a mulch.

*Conclusion*: Better effects appear to result from the deep cultivation of egg plants with the horse hoe than from shallow hand work.

3. *Is Frequent Cultivation Essential?* The writer has usually advised cultivating egg plants as often as once a week. And is often met by the farmer with the objection of "too much bother." An attempt was made the present season to determine if frequent

cultivation really is essential to success. Some plants were given the ordinary treatment of our garden, while a duplicate lot was given only sufficient attention to keep down the weeds. Unfortunately the varieties used—New York Improved and Round Purple—proved so unproductive that we are not justified in drawing final conclusions. In this instance, however, the plants given infrequent cultivation produced fully as many fruits as those under conditions usually regarded as more favorable. If it be proved that the egg plant may be grown with less care than commonly supposed, the fact, though of no importance to the gardener, may serve to remove some objections to the more common use of this vegetable.

4. *Effects of Root Pruning*: To ascertain whether a sudden check in the growth of the plants would result in increasing the number of fruits set, several of the main roots of a number of plants were severed August 19, after a small number of fruits had formed. Results were contradictory. Some varieties showed considerable increase in the number of fruits set, as compared with duplicate plants not pruned; others were apparently injured by the operation. The advantage of the operation from a practical point of view is questionable.

### Summary.

1. The percentage of plants bearing marketable fruits, and the productiveness of individual plants, are increased by early setting in the field.

2. Better results are obtained from deep cultivation with the horse hoe than from shallow hand work.

3. Early dwarf varieties may be successfully grown with the ordinary care given tomato plants.

4. The advantage of root pruning egg plants is questionable.

## V—Notes of Potatoes.

The principal work heretofore undertaken with potatoes has been in the line of a study of the influence of climate in causing variation of the plant—an experiment still in progress. During the past season a few experiments with different methods of culture were taken up incidentally.

1. *A comparison of the Trench System with Ordinary Culture*: A few years ago considerable interest was aroused by the accounts of wonderful yields of potatoes obtained by a system of culture

known as the *Rural New Yorker Trench System.* The system derives its name from the fact that it was first used at the trial grounds of the *Rural New Yorker*, and was advocated by the editor of that paper, Mr. E. S. Carman.

The system consists essentially in planting the tubers in trenches, five to seven inches deep and twelve to fifteen inches wide, the bottoms of which are well pulverized; covering to a depth of about two inches; then applying any desired amount of fertilizer in the trench; after which the trenches are filled so that after settling the surface shall be level.

Now it has been the practice of the writer for several years to plant in furrows, applying fertilizers broadcast on the surface of the ground, for there is little doubt that the old custom of "hilling" potatoes is worse than useless, it is positively injurious to the crop on dry soils It has seemed doubtful, in view of the fact that the roots of the potato extend in all directions, filling the whole space between the rows, whether placing the fertilizer in a trench only, could be as rational, or in practice as satisfactory, as the other method.

In the paper referred to and also in a book recently published, the statement is made that, "In every trial made the land laid out in trenches whether with or without fertilizer or manure has largely out-yielded that planted according to the old method of furrows or hills."*

In an issue of the *Rural New Yorker* of recent date is a detailed account of a comparison of the two methods as conducted on the grounds of the originator of the "Trench system." From this trial the following conclusions were drawn:

"There is a difference in the total yield per acre of only one-half bushel (.49) in favor of the trenches, but of the *marketable* potatoes there is a difference of over seventeen bushels per acre in favor of the trenches.

"The yield of small potatoes (unmarketable) of the furrows is 16.79 bushels per acre greater than that of the trenches."†

The work of this Station planned without the knowledge that similar work was being undertaken elsewhere, is detailed below:

* The New Potato Culture, page 35.

† Rural New Yorker, October 14, 1893, page 683.

On a piece of sandy loam, having a Southern aspect, alternate rows of the varieties named below were planted three and one-half feet apart—one being "trenched," the other planted in a furrow. The rows "trenched" were plowed about a foot wide and eight inches deep, after which the soil in the bottom of the furrow was loosened and pulverized, some earth being worked back into the furrow, the "seed" cut into two eyes was then planted one foot apart in the row. The pieces were covered to a depth of about two inches when a complete fertilizer at the rate of 1,000 pounds to the acre was scattered in the trenches, and the trenches were filled. The other rows were simply plowed, the seed pieces dropped and covered, when the same amount of fertilizer as before was scattered on the surface. As soon as the young shoots appeared above the surface, the smoothing harrow was used, and thorough culture was given until about the middle of July when the vines covered the ground sufficiently to keep the weeds down and serve as a mulch for themselves.

The comparative results are shown in the accompanying table:

TABLE XII.

TRENCH SYSTEM *vs.* ORDINARY CULTURE OF POTATOES.

| VARIETY AND SYSTEM. | Weight of product—lbs. | Weight of marketable tubers—lbs. | Weight of small tubers—lbs. | Average number marketable tubers per hill. | Yield per acre of marketable tubers—bushels. | Yield per acre of small tubers—bushels. |
|---|---|---|---|---|---|---|
| EARLY ROSE. | | | | | | |
| No 1. Furrow | 58.87 | 51.03 | 7.84 | **5.6** | **234.4** | **34.6** |
| Trench | 61.48 | 53.24 | 8.24 | **5.0** | **244.8** | **37.9** |
| No. 2. Furrow | 80.00 | 71.00 | 9.00 | **6.9** | **327.7** | **41.5** |
| Trench | 79.23 | 68.72 | 10.51 | **6.1** | **317.4** | **48.5** |
| CRANE'S JUNE. | | | | | | |
| No. 1. Furrow | 69.90 | 62.00 | 7.90 | **6.0** | **286.2** | **36.3** |
| Trench | 66.30 | 54.81 | 11.49 | **5.2** | **253.1** | **52.9** |
| No. 2. Furrow | 70.19 | 58.45 | 11.74 | **5.9** | **269.6** | **54.1** |
| Trench | 71.57 | 61.04 | 10.53 | **5.8** | **282.1** | **48.5** |
| HEBRON. | | | | | | |
| Furrow | 64.15 | 59.12 | 5.03 | **5.4** | **271.7** | **23.2** |
| Trench | 74.07 | 65.16 | 8.91 | **5.4** | **300.8** | **41.1** |

In every instance duplicate lots produced contradictory results. The first lot of Early Rose gave a greater yield from the trench—the difference being nearly ten bushels of marketable tubers per acre. The second lot reverses these figures so far as the marketable tubers are concerned, but the increased numbers of small tubers makes the total yield practically the same with the two methods of treatment. The first lot of Crane's June gave a difference of thirty-three bushels of marketable tubers per acre in favor of the furrow; while in the second lot the trench produced at the rate of twelve bushels per acre more than the other.

In each instance above mentioned, the number of marketable tubers per hill was slightly smaller in the trenches, and the weight of individual tubers was somewhat greater; on the other hand, with one exception the small tubers from the trenches excelled in weight and number those from the furrows.

Hebron from the trench was superior to the same variety from the furrow. The number of tubers per hill was the same, but the individual tubers from the trench were so much superior as to be equivalent to an excess of twenty-nine bushels per acre over the other.

It will be seen that these facts are in a measure opposed to conclusions concerning the system which have heretofore been published. We would not, however, condemn the method without further trial. It is but just to say, however, that certain parties quoted as obtaining specially marked results from the use of the "trench system" have discarded the method in their general practice.

*Conclusion*: It is questionable whether the results obtained will justify the extra labor involved in practicing the trench system of potato culture. In our trials the past season duplicate lots in every instance produced contradictory results.

## VI—Notes of Spraying Experiments.

Spraying with some solution of copper for protection from the attack of the apple scab is coming to be looked upon as a necessity by many of the more progressive orchardists. During the past three seasons the writer has been engaged in solving some of the problems incident to this work. The results, so far as obtained, have been detailed in the annual reports of the experiment station.*

The principal work of the present season was a comparison of the effectiveness of different mixtures. The failure of certain trees,

* Report Maine Experiment Station, 1891, page 112; and 1892, page 92.

set apart for that purpose, prevented reaching more definite conclusions regarding the best time for spraying

The materials used in the work here mentioned, were as follows:

1st.—*Modified eau celeste.*—2 lbs. copper sulphate, 1 1-2 lbs. carbonate of soda, 1 1-2 pts ammonia and thirty-five gallons of water.

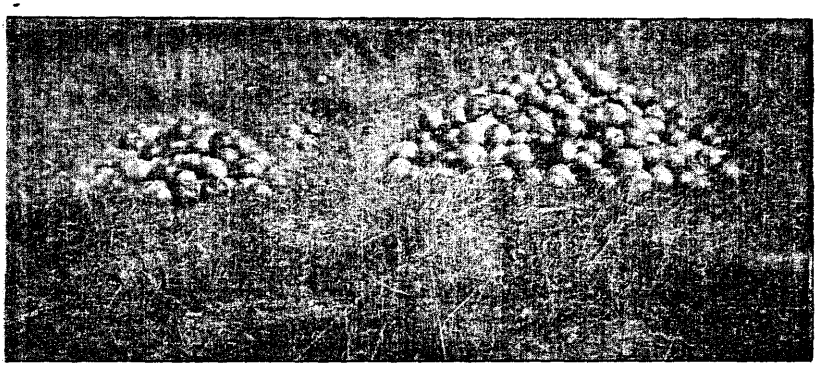
2nd.—*Bordeaux Mixture.*—6 lbs. copper sulphate (Blue Stone), 4 lbs. fresh lime dissolved separately, then mixed and diluted to 40 gallons.

3d.—*Bordeax Mixture and Paris Green.*—Same as No 2 with addition of Paris Green in the proportion of 1 lb to 150 gallons.

4th.—*Paris Green* —1 lb. Paris green in 250 gallons water.

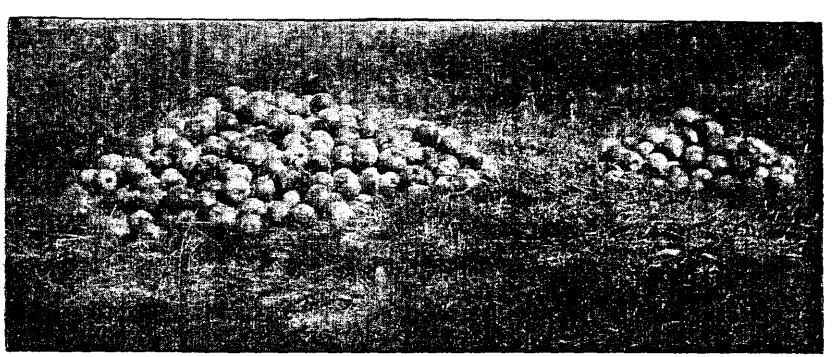
The season was very dry and the trees were much freer from scab than in previous years. That there was marked benefit from the treatment is, however, shown in the accompanying photographs of fruit from contiguous trees and also in the table.

NO. 1—NOT SPRAYED.



Free, 130. Badly Scabbed, 17. Slightly Scabbed, 392.

NO. 2—SPRAYED.



Free, 474. Badly Scabbed, 3. Slightly Scabbed, 114.

TABLE XIII.

RESULTS OF SPRAYING TO PREVENT APPLE SCAB.

| TREATMENT. | Number fruit examined. | Free from scab. | Slightly scabbed. | Badly scabbed. | Per cent free. |
|---|---|---|---|---|---|
| EAU CELESTE | 651 | 480 | 156 | 15 | **73.7** |
| | 557 | 360 | 189 | 8 | **64.6** |
| | 459 | 368 | 73 | 18 | **80.2** |
| Average per tree | **556** | **403** | **139** | **14** | **72.8** |
| BORDEAUX MIXTURE | 501 | 399 | 91 | 11 | **79.6** |
| | 591 | 474 | 114 | 3 | **80.2** |
| Average per tree | **546** | **436** | **102** | **7** | **79.9** |
| BORDEUAX MIXTURE AND PARIS GREEN | 811 | 677 | 128 | 6 | **83.5** |
| | 639 | 509 | 126 | 4 | **79.7** |
| | 615 | 524 | 87 | 4 | **85.2** |
| Average per tree | **755** | **570** | **114** | **5** | **82.8** |
| CHECKS, NOT SPRAYED | 566 | 214 | 337 | 15 | **37.8** |
| | 550 | 291 | 248 | 11 | **52.9** |
| | 539 | 130 | 392 | 17 | **24.1** |
| Average per tree | **552** | **212** | **292** | **14** | **38.3** |

Much of the fruit classed as "slightly scabbed" would grade as No. 1 fruit, but as is well known, the fungus grows rapidly after the fruits are packed ; hence our arbitrary line between fruit *absolutely free* from scab and that slightly affected is rigidly adhered to.

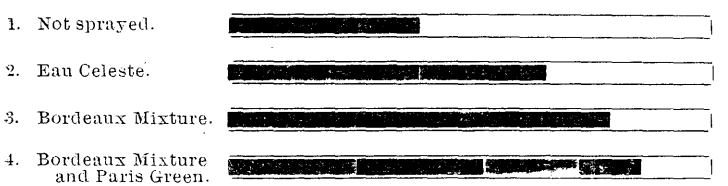
As shown by the table, the best results were obtained from the use of a combination of Bordeaux mixture and Paris green. This fact would indicate a possible fungicidal value for Paris green. That this value is slight, however, was shown by some trees sprayed with Paris green only. Our experiments have not been sufficiently extended to warrant definite conclusions on this point. The Paris green has, however, an important use in reducing the proportion of wormy fruits.

*Eau Celeste*, while less effectual than Bordeaux mixture in preventing scab, was found to injure the foliage unless used with caution. The fruit also, was made somewhat rusty—the epidermis apparently being injured by the ammonia.

The relative value of the different materials used may best be summarized as follows:

| | | |
|---|---|---|
| Checks, not sprayed | 38.3 | per cent free from scab. |
| Modified *Eau Celeste* | 72.8 | " " " " |
| Bordeaux mixture | 79 9 | " " " " |
| Bordeaux mixture and Paris green, | 82 8 | " " " " |

These differences are graphically portrayed in the accompanying diagram, in which the shaded portion represents the per cent of fruit free from scab.




The concensus of opinion among experimenters at the present time places Bordeaux mixture at the head of the list of fungicides. A general summary of results obtained by the writer during the past three seasons is as follows, the figures representing the per cent. of fruit free from scab:

SPRAYING EXPERIMENTS, 1891-93.

| | Checks not sprayed. | Ammonio-copper carbonate. | Modified eau celeste, | Bordeaux mixture. |
|---|---|---|---|---|
| 1891 | 4.1 | 47.8 | 57.8 | |
| 1892 | .93 | 6.1 | 30.1 | |
| 1893 | 38.3 | - | 72.8 | 79.9 |

## A BRIEF RETROSPECT.

For the benefit of those who have not received previous reports, it may be well to give a brief resumé of the results obtained from three seasons' experiments.

We have seen that apple scab is caused by a parasitic fungus which attacks the leaves and young twigs as well as the fruit, and that the growth of the tree may be seriously checked. Spraying the trees with certain compounds of copper has been found an effective means of holding the disease in check,—the increase of salable fruit, as a result of spraying, often amounting to 50 per cent.

Indications point strongly to the value of spraying early in the season, before the blossoms open, and of repeating the application four or five times during the season.

The best results have been obtained from the use of Bordeaux mixture, prepared as follows: 6 pounds copper sulphate (Blue Stone); 4 pounds quick lime; 40 gallons water.

Dissolve the copper in a pail of hot water; slake the lime in another vessel; mix and dilute as above for use.

Farmers are advised to club together in the purchase of apparatus and chemicals, thus reducing expense.

Necessary chemicals may be obtained in large quantities of: Weeks & Potter Company, Boston; Eimer & Amend, 205 Third Avenue, New York; W. S. Powell & Company, Baltimore, Md. Most of the materials may be purchased in small amounts at the local drug store.

Force pumps and other apparatus for spraying may be obtained of any of the leading manufacturers, as: Field Force Pump Company, Lockport, N. Y.; Gould's Manufacturing Company, Seneca Falls, N. Y.; W. & B. Douglass, Middletown, Conn.; The Deming Company, Salem, O.

The most satisfactory nozzle we have used is the "McGowen," manufactured by John J. McGowen, Ithaca, N. Y. Our second choice is the "Climax," manufactured by the Nixon Nozzle and Machine Company, Dayton, O.

For spraying currant bushes, or for general garden use, the "Knapsack Sprayer" made by the Gould's Manufacturing Company, Seneca Falls, N. Y., has been found very satisfactory. Similar machines may be obtained from the other sources mentioned above.

## VII—Catalogue of Maine Fruits.

One of the most important lines of work receiving attention from this division is that of the systematic effort to improve the character of some of our native fruits, and to select from the ever increasing list of new varieties, those best suited for the different sections of the state. This work is still in its infancy and no results can yet be reported. It is thought best, however, to publish a catalogue of the fruits grown in the state at the present time with an indication of their approximate value in different sections.

The descriptions of fruits are mostly taken from the fruit list of the American Pomological Society, and the values accorded are given only after carefully considering the recommendations of leading fruit growers in different parts of the State. Information concerning many varieties, especially in the northern sections is very meagre. It is hoped before a revision of the list is made,—as will necessarily follow in course of two or three years,—more valuable data may be available.

Of the newer apples named in the catalogue, Dudley's Winter, a seedling of Oldenburg originated by J. W. Dudley of Castle Hill, Aroostook county, is one of the most valuable "iron clad" varieties. This variety is being disseminated by a New York firm as "North Star"—an unfortunate circumstance as there is another variety bearing that name by right of priority.

Hayford Sweet is another valuable iron-clad variety originating with C. Hayford, Maysville, Aroostook county. It is in itself a valuable fruit and succeeds where Talman Sweet fails.

Rolfe and Russell are also deserving of special mention. Mother, as a fruit for home use, is not as widely known as it should be; but it is not a profitable market variety.

Of the newer pears, Admiral Farragut, Eastern Belle, Fulton, Indian Queen and Nickerson are promising, hardy varieties. These are not of the highest quality but they are hardy and productive—important considerations especially for the northern and central portions of the state.

Flemish Beauty, formerly grown in many sections of the state, has been almost universally discarded because of the prevalence of pear scab (*Fusicladium pyrinum*). It is hoped that by the aid of the Bordeaux mixture we may yet retain this valuable variety.

Moore Arctic plum, (a native of Ashland, Aroostook county), because of its productiveness and extreme hardiness, is planted more extensively than any other variety in northern Maine. It is not, however, of the best quality. The Japanese varieties, Abundance and Burbank, are being tried to a limited extent in the southern portions of the state, but they can succeed only in the southern counties. McLaughlin, originated at Bangor more than forty years ago, is still one of our most valuable dessert plums. It is, however, rather tender for market purposes.

DeSoto, Forest Garden, Wolf, and some other varieties of the native "horse plum" or "pomegranate" (*Prunus Americana*), promise to be of some importance for the colder portions of the state.

Small fruits, though not largely grown for market, do well in all of the central and southern counties. The cool moist climate is specially adapted to the wants of the currant and gooseberry. Even as far north as Houlton, Aroostcok county, the gooseberry is a profitable market crop; and if, as now seems probable, the English varieties will succeed in this climate, a very profitable industry is opened along this line.

The widely varying conditions existing in different parts of the state render a general statement as to the value of any given variety only approximately correct. Varieties which may be of merit in the southern portions of the state are not sufficiently hardy for the middle and northern counties. On the other hand, some sorts considered specially valuable in Aroostook county are unknown in York In the accompanying catalogue we have assigned separate columns for the value of each variety in the northern and the southern parts of the state. The first column, marked "North," includes Aroostook, Piscataquis, and the northern parts of Somerset, Penobscot and Washington counties. The column marked "South," includes Oxford, Kennebec, Waldo, and all of the southern counties.

The value of any given variety is indicated thus: Two stars (* *) indicate a variety of special merit, one to be recommended for general culture. One star (*) shows that the variety is worthy of cultivation, though not superior. A dagger (†) indicates a new and promising variety, or an old variety not fully tested in this region. A dash (—) shows that the variety has been tried and found wanting.

The abbreviations used in describing the size*, form, color, etc., of the various classes of fruits are fully explained at the head of each list. Take for example the Alexander apple. We see that this is a large striped apple of roundish-conical form and moderately good quality, useful for cooking and market early in autumn.

*A few varieties of apples usually described as large, are as grown in this state, of only medium size—e. g. Baldwin, Golden Sweet, Hubbardston, Porter.

## APPLES.

ABBREVIATIONS USED.—*Size*,—l, large; m, medium; s, small. *Form*,—r c, roundish-conical; r ob, roundish-oblate; r, roundish. *Color*,—y r, yellow and red; r s, red striped; g y, greenish yellow; rus, russeted; y rus, yellow and russet. *Quality*,—g, good; v g, very good; b, best. *Use*,—F, family use; K M, kitchen and market; F M, family and market. *Season*,—S, summer; E A, early autumn; L A, late autumn; W, winter. *Origin*,—usual abbreviations for names of countries.

| Number. | Names. | Description. | | | | | | | Value. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Size. | Form. | Color. | Quality. | Use. | Season. | Origin. | North. | South. |
| 1 | Alexander | l | r c | r s | g | K M | E A | Rus. | * | * |
| 2 | August | .... | .... | .... | .... | .... | .... | .... | † | .... |
| 3 | Autumn | .... | .... | .... | .... | .... | .... | .... | † | .... |
| 4 | Bailey Sweet | l | r c | r s | v g | F M | L A | Am. | .. | * |
| 5 | Baldwin | l | r c | r g | v g | F M | W | Am. | — | ** |
| 6 | Beauty of Kent | l | r c | r s | g | K M | L A | Eng. | .... | * |
| 7 | Ben Davis | l | r c | y r | g | K M | W | Am. | — | ** |
| 8 | Benoni | m | r ob | y r | v g | F M | S | Am. | .... | * |
| 9 | Black Oxford | .... | .... | .... | .... | .... | .... | .... | — | — |
| 10 | Bloom | .... | .... | .... | .... | .... | .... | .... | † | .... |
| 11 | Blue Pearmain | l | r c | r | g | M | W | ..... | — | * |
| 12 | Bullock, *American Golden Russett* | s | r c | y rus | b | F M | W | Am. | ... | * |
| 13 | Canada Baldwin | m | ob | r | v g | ..... | W | Can. | .... | * |
| 14 | Chenango (Strawberry), *Sherwood Favorite* | m | ob c | g r | v g | F M | E A | Am. | ... | * |
| 15 | Cole Quince | l | r ob | g y | v g | F M | W | Am. | .... | * |
| 16 | Colton | .... | .... | .... | .... | .... | .... | .... | † | .... |
| 17 | Cooper Market | m | r c | y r | g | M | W | Am. | ... | * |
| 18 | Danvers Sweet, *Danvers Winter* | m | r ob | g y | v g | F M | W | Am. | .... | * |
| 19 | Dudley Winter | m | r ob | y r | g | F M | W | Am. | ** | * |
| 20 | Dyer, *Pomme Royal* | m | r | g y | v g | F | E A | F. | .... | * |
| 21 | Early Harvest | m | r ob | g y | v g | F M | S | Am. | * | * |
| 22 | Early Scarlet | .... | .... | .... | .... | .... | .... | .... | † | .... |
| 23 | Early Strawberry *Red Juneating* | s | r | r s | v g | F | S | Am. | .... | * |
| 24 | English Russett, *Poughkeepsie Russett* | m | r c | y rus | v g | F M | W | Eng. | .... | — |
| 25 | Esopus Spitzenburg | l | ob | y r | b | F M | W | Am. | .... | * |
| 26 | Fallawater | l | r c | g y | g | M | W | Am. | .... | * |
| 27 | Fall Harvey | l | r ob | g y | g | M | L A | Am. | .... | * |
| 28 | Fall Jenneting | l | fl | g y | g | M | E A | Am. | † | * |
| 29 | Fall Pippin | l | r ob | g y | v g | F M | L A | Am. | .... | * |
| 30 | Fall Queen, *Haas, Gros Pommier* | m | ob c | y r | g | F M | A | Am. | — | — |
| 31 | Fameus, *Snow Apple* | m | r ob | r s | v g | F M | W | F. | ** | ** |
| 32 | Foundling | m | r ob | y r | g | F | A | Am. | † | * |
| 33 | Garden Royal | m | r c | y r | b | F | S | Am. | — | * |
| 34 | Garden Sweet | m | r ob | y r | v g | K M | A | Am. | ... | * |
| 35 | Gideon | .... | .... | .... | .... | .... | .... | .... | — | — |
| 36 | Golden Russet of Western N. Y. | m | r ob | y rus | v g | F M | W | ..... | .... | * |
| 37 | Golden Sweet | l | r | g y | v g | F M | S | Am. | .... | * |
| 38 | Granite (Beauty) | l | r ob | y r | g | F M | W | Am. | .... | ** |
| 39 | Gravenstein | l | r ob | y r | v g | F M | L A | Ger. | — | ** |
| 40 | Grimes Golden | m | r ob | g y | v g | F | W | Am. | — | * |
| 41 | Hayford Sweet | s | r c | y r | g | F M | W | Am. | ** | † |
| 42 | High Top Sweet, *Sweet June* | s | r | g y | v g | F M | S | Am. | — | * |
| 43 | Hubbardston, *Hubbardston Nonesuch* | l | r c | y r | v g | F M | W | Am. | .... | ** |

7, valuable for distant market; worthless for home use. 12, 24 and 36 are often confounded; 36 is the variety most commonly met. 26, handsome, but coarse and of inferior quality in this climate. 39, one of the most valuable autumn varieties.

## Apples—Continued.

| Number. | Names. | Description. | | | | | | | Value. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Size. | Form. | Color. | Quality. | Use. | Season. | Origin. | North. | South. |
| 44 | Hunt Russett | m | r ob | y rus | v g | F M | W | Am. | .... | * |
| 45 | Hurlbut | m | r ob | y r | g | F M | L A | Am. | .... | * |
| 46 | Jewett Red, *Jewett's Fine Red, Nodhead* | m | r ob | r | g | F M | W | Am. | .... | ** |
| 47 | Late Strawberry, *Autumn Strawberry* | m | r | y r | v g | F M | L A | Am. | .... | * |
| 48 | Longfield | m | r ob | y r | g | K M | L A | Rus. | † | * |
| 49 | Magog Red Streak | .... | .... | .... | .... | .... | .... | .... | † | .... |
| 50 | Maiden Blush | m | r | g y | g | K M | E A | Am. | .... | * |
| 51 | Mann | m | r ob | y r | v g | F M | W | Am. | — | * |
| 52 | McIntosh | m | r ob | y r | v g | F M | W | Am. | .... | * |
| 53 | Mexico | m | r ob | r s | v g | F M | A | Am. | .... | † |
| 54 | Milden or Milding | l | fl | y r | v g | F M | E W | Am. | .... | * |
| 55 | Minister | l | ob | r s | g | K M | L A | Am. | .... | * |
| 56 | Monroe Sweet | .... | .... | .... | .... | .... | .... | .... | † | .... |
| 57 | Mother | m | r c | y r | b | F M | W | Am. | .... | ** |
| 58 | Munson Sweet, *Orange Sweet* | m | fl | y g | g | K M | L A | Am. | .... | * |
| 59 | New Brunswick Greening | .... | .... | .... | .... | .... | .... | .... | † | .... |
| 60 | Northern Spy | l | r c | y r | b | F M | W | Am. | — | ** |
| 61 | Oldenburg, *Duchess of Oldenburg* | m | r ob | y r | g | M | S | Rus. | ** | ** |
| 62 | Peabody Greening | .... | .... | .... | .... | .... | .... | .... | — | .... |
| 63 | Peach (of Montreal) | m | r c | y s | v g | F M | A | F. | * | .... |
| 64 | Peck Pleasant | m | r | g y | v g | F M | W | Am. | .... | * |
| 65 | Pewaukee | l | fl | r s | g | F M | W | Am. | * | * |
| 66 | Porter | l | ob | g y | b | F M | A | Am. | — | ** |
| 67 | President | l | r ob | y | g | F | A | Am. | .... | * |
| 68 | Primate | m | r c | g y | b | F | E A | Am. | .... | * |
| 69 | Prolific Sweeting | .... | .... | .... | .... | .... | .... | .... | † | .... |
| 70 | Pumpkin Sweet, *Lyman's Pumpkin Sweet, Pound Sweet* | l | r ob l | y | g | K M | E W | Am. | .... | * |
| 71 | Ramsdell Sweet | m | ob | y r | g | K M | L A | .... | .... | ** |
| 72 | Red Astrachan | l | r | y r | g | K M | S | F. | * | ** |
| 73 | Red Beitigheimer | .... | .... | .... | .... | .... | .... | .... | † | † |
| 74 | Red Canada, *Old Nonesuch, Richfield Nonesuch, Steele's Red Winter* | m | r ob | y r | b | F M | W | ..... | † | * |
| 75 | Rhode Island Greening | l | r ob | g y | v g | F M | W | Am. | — | ** |
| 76 | Ribston, *Ribston Pippin* | m | r | y r | v g | F M | W | Eng. | .... | * |
| 77 | Rolfe, *Macomber* | m | r c | y r | v g | F M | W | Am. | — | ** |
| 78 | Rome Beauty | l | r | y r | g | M | L A | Am. | .... | † |
| 79 | Roxbury Russett | m | r ob | y rus | v g | F M | W | Am. | .... | * |
| 80 | Russell | l | ob | y | v g | F | E A | Am. | † | † |
| 81 | Saint Johnsbury Sweet | .... | .... | .... | .... | .... | .... | .... | † | .... |
| 82 | Saint Lawrence | l | fl | y r | v g | M | A | ..... | † | * |
| 83 | Sarah | l | fl | r s | v g | F M | E A | Am. | .... | † |
| 84 | Scott's Winter | .... | .... | .... | .... | .... | .... | .... | † | .... |
| 85 | Somerset (of Maine) | m | fl | r s | v g | F | S | Am. | .... | * |
| 86 | Sops of Wine, *Hominy* | m | r | y r | g | K M | E A | Eng. | — | * |
| 87 | Stark | l | r c | y r | g | F | W | Am. | .... | * |
| 88 | Starkey | m | r ob | y r | v g | F M | E W | Am. | .... | * |
| 89 | Summer Pearmain, *American Summer* | m | ob | y r | b | F | S | Am. | .... | * |
| 90 | Summer Paradise | l | r | g y | v g | F | E A | Am. | .... | * |
| 91 | Sutton, *Sutton Beauty* | m | r ob | r s | v g | F M | E W | Am. | .... | † |
| 92 | Swaar | l | r ob | g y | b | F M | W | Am. | .... | † |
| 93 | Sweet Bough, *Large Yellow Bough* | l | ob | g y | v g | F M | S | Am. | .... | * |
| 94 | Sweet Janet | .... | .... | .... | .... | .... | .... | .... | .... | † |

## Apples—Concluded.

| Number. | Names. | Description. | | | | | | | Value. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Size. | Form. | Color. | Quality. | Use. | Season. | Origin. | North. | South. |
| 95 | Tetofsky | m | fl c | y r | g | K | S | Rus. | ** | * |
| 96 | Talman Sweet | m | r | g y | v g | K M | W | Am. | ** | — |
| 97 | Tompkins King, *King of Tompkins County* | l | r | y r | v g | F M | W | Am. | — | * |
| 98 | Twenty Ounce, *Cayuga Red Streak* | l | r | r s | v g | F M | L A | Am. | .... | * |
| 99 | Wagener | m | r ob | y r | b | F | W | Am. | .... | * |
| 100 | Walbridge | ... | ..... | ..... | ..... | ..... | ..... | ..... | † | .... |
| 101 | Washington (Strawberry) | l | r c | y r | v g | F M | E A | Am. | .... | * |
| 102 | Wealthy | m | r ob | r | v g | F M | W | Am. | ** | * |
| 103 | Westfield (Seek-no-further) | l | r c | y r | b | F M | W | Am. | .... | * |
| 104 | Williams (Favorite) | m | r c | g y | g | M | S | Am. | — | ** |
| 105 | Wine, *Hay's Wine, Pennsylvania Red Streak* | l | r | y r | v g | F M | W | Am. | ... | * |
| 106 | Winesap | m | r | y r | v g | F M | W | Am. | .... | * |
| 107 | Winthrop Greening | l | ob | g y | g | K M | A | Am. | .... | * |
| 108 | Wolf River | l | r ob | r | g | F M | W | Am. | .... | † |
| 109 | Yellow Bellefleur | l | ob | g y | v g | F M | W | Am. | — | ** |
| 110 | Yellow Transparent | m | r ob | y | g | ..... | E S | Rus. | ** | * |

## APPLES—Crabs.

| Number. | Names. | Description. | | | | | | | Value. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Size. | Form. | Color. | Quality. | Use. | Season. | Origin. | North. | South. |
| 1 | Hayden | .... | .... | .... | .... | ..... | ..... | ..... | † | ... |
| 2 | Hyslop | l | r | r | g | F M | A | Am. | * | * |
| 3 | Lady Elgin | l | r ob | y r | v g | F M | L A | Am. | ** | .... |
| 4 | Marengo | l | r fl | y r | g | F M | W | Am. | .... | † |
| 5 | Montreal Beauty | l | r ob | y r | g | F M | A | Am. | .... | * |
| 6 | Red Siberian | m | r | r | g | F M | A | F. | .... | * |
| 7 | Transcendent | l | r ob | y r | g | F M | A | Am. | * | ** |
| 8 | Van Wyck | .... | .... | .... | .... | ..... | ..... | ..... | .... | * |
| 9 | Yellow Siberian | m | r | y | g | F M | A | F. | .... | * |

## BLACKBERRIES.

ABBREVIATIONS—*Size*,—l, large; m, medium; s, small. *Form*,—ob c, oblong conic; r c, roundish conical or oval; ob ov, oblong oval. *Color*,—b, black. *Quality*, —g, good; v g, very good; b, best. *Use*,— F M, family and market; M, market. *Season*,—M, medium; E, early; L, late. *Origin*,—Am, American; F, foreign.

| Number. | Names. | Description. | | | | | | | Value. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Size. | Form. | Color. | Quality. | Use. | Season. | Origin. | North. | South. |
| 1 | Agawam | ... | ..... | ... | .... | ..... | ..... | ..... | * | ** |
| 2 | Ancient Briton | l | ob ov | b | v g | F M | M | Am. | .... | † |
| 3 | Early Harvest | m | ov | b | g | F M | V E | Am. | ... | — |
| 4 | Erie | l | ob ov | b | g | F M | M | Am. | .... | † |
| 5 | Kittatinny | l | r c | b | g | F M | M | Am. | .... | — |
| 6 | Lawton, *New Rochelle* | l | ov | b | g | M | L | Am. | .... | — |
| 7 | Minnewaski | l | ov | b | g | M | M | Am. | .... | †— |
| 8 | Snyder | m | r ov | b | v g | F M | E | Am. | † | ** |
| 9 | Stone (Hardy) | l | ob | b | g | F | ..... | Am. | .... | † |
| 10 | Taylor, *Taylor's Prolific* | l | ..... | b | g | F M | ..... | Am. | .... | † |
| 11 | Tree, *Child's Ever-bearing Tree* | .... | ..... | .... | .... | ..... | ..... | ..... | .... | — |
| 12 | Wauchusett | m | ob ov | b | v g | F M | M | Am. | .... | — |
| 13 | Wilson (Early) | l | ob ov | b | v g | M | E | Am. | .... | * |
| 14 | Wilson Junior | l | ob ov | b | v g | M | E | Am. | .... | † |

## DEWBERRIES.

ABBREVIATIONS.—Same as for blackberries.

| Number. | Names. | Description. | | | | | | | Value. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Size. | Form. | Color. | Quality. | Use. | Season. | Origin. | North. | South. |
| 1 | Lucretia | l | ob ov | b | v g | F M | V E | Am. | .... | † |
| 2 | Windom | .... | ..... | .... | .... | ..... | ..... | ..... | † | † |

## CHERRIES.

ABBREVIATIONS.—*Size*,—l, large; m, medium; s, small. *Form*,—ob h, obtuse heart shape; r ob h, roundish obtuse heart shape; r h, roundish heart shape; r, roundish or round. *Color*,—l r, lively bright red; d r, dark red, almost black; a m, amber mottled with red; y r, yellow ground, shaded and marbled with red. *Use*,—F, family, for dessert: F M, family or market; K M, cooking or market; M, market. *Season*,—E, early; M, medium; L, late. *Origin*,—F, foreign; Am, American.

| Number. | Names. | Description. | | | | | | Value. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Size. | Form. | Color. | Use. | Season. | Origin. | North. | South. |
| | HEARTS AND BIGARREAUS. | | | | | | | | |
| 1 | Bigarreau, *Graffion, Yellow Spanish* | l | ob h | y r | F M | M | F | .... | † |
| 2 | Black Heart | l | r h | d r | F M | M | F | ... | * |
| 3 | Black Tartarian | l | r h | d r | F M | M | F | .... | * |
| 4 | Coe's Transparent | m | r | a m | F | M | Am | .... | * |
| 5 | Downer's Late | m | r h | y r | F M | L | Am | .... | * |
| 6 | Early Purple, *Early Purple Guigne* | m | r h | d r | F M | E | F | ... | * |
| 7 | Elton | l | r h | y r | F M | M | F | .... | * |
| 8 | Governor Wood | l | r h | y r | F M | M | Am | .. | * |
| 9 | Napoleon | l | r ob h | y r | F M | M | F | .... | * |
| 10 | Windsor | l | r h | d r | M | L | Am | .... | † |
| | DUKES AND MORELLOS. | | | | | | | | |
| 41 | Choisy | m | r | a m | F | M | F | .... | * |
| 12 | Early Richmond | s | r | l r | K M | E | F | .... | * |
| 13 | Hortense | l | r | l r | F M | L | F | .... | † |
| 14 | Late Duke | l | ob h | d r | K M | L | ..... | ... | * |
| 15 | Louis Phillippe | l | r | d r | K M | L | F | .... | * |
| 16 | Magnifique | l | r h | l r | K M | L | F | .... | * |
| 17 | May Duke | l | r ob h | d r | K M | E | F | .... | * |
| 18 | Montmorency, Large | l | r | d r | K M | M | F | .... | † |
| 19 | Montmorency, Ordinaire | .... | ... | .... | ..... | .... | ..... | .... | † |
| 20 | Morello, *English Morello, Large Morello* | l | r h | d r | K M | L | F | .... | * |

## CURRANTS.

ABBREVIATIONS.—*Size*,—l, large; m, medium; s, small. *Form*,—with reference to form of bunch,—l, long; v l, very long; s, short; m, medium. *Color*,—r, red; b, black; w, white. *Quality*,—a, acid; m a, moderately acid; v a, very acid. *Use*,—K M, kitchen and market; F M, family and market; M, market. *Season*,—E, early; M, medium; L, late. *Origin*,—Am, American; F, foreign.

| Number. | Names. | Description. | | | | | | | Value. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Size. | Form. | Color. | Quality. | Use. | Season. | Origin. | North. | South. |
| 1 | Black Naples | l | s | b | m a | K M | M | F | .... | * |
| 2 | Cherry | l | s | r | v a | M | M | F | * | * |
| 3 | Fay, *Fay's Prolific* | l | l | r | m a | F M | M | Am | ** | ** |
| 4 | Lee, *Lee's Prolific* | l | l | b | m a | K M | M | F | .... | * |
| 5 | Moore Ruby | m | .... | ..... | ..... | ..... | ..... | ..... | .... | † |
| 6 | Prince Albert | l | l | r | m a | M | L | F | .... | * |
| 7 | Red Dutch | m | m | r | m a | F M | E | F | * | * |
| 8 | Versaillaise, *La Versaillaise* | l | s | r | a | M | M | F | .... | ** |
| 9 | Victoria, *Raby Castle* | l | v l | r | a | F M | L | F | .... | * |
| 10 | White Grape | m | l | w | m a | F M | E | F | ** | ** |

## GOOSEBERRIES.

ABBREVIATIONS.—*Size*,—l, large; m, medium; s, small. *Form*,—r, round; o, oval; r o, roundish oval. *Color*,—r, reddish when fully ripe: g, greenish yellow when fully ripe. *Quality*,—g, good; v g, very good; b, best. *Use*,—K, kitchen; M, market. *Season*,—E, early; M, medium; M L, medium-late. *Origin*,—Am, American; F, foreign.

| Number. | Names. | Description. | | | | | | | Value. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Size. | Form. | Color. | Quality. | Use. | Season. | Origin. | North. | South. |
| 1 | Downing | m | r o | g | v g | K | M L | Am | * | ** |
| 2 | Houghton | s | r o | r | g | K M | E | Am | ** | ** |
| 3 | Industry | l | r o | r | v g | K | M | F | .... | † |
| 4 | Smith, *Smith's Improved* | l | o | g | v g | K M | M | Am | * | * |
| 5 | Whitesmith | l | o | g | v g | K M | M | F | .... | † |

## GRAPES.

ABBREVIATIONS.—*Size*,—with reference to the berry,—l, large; m, medium; s, small. *Form*,—with reference to bunch and berry,—s r, short bunch, round berry; l r, large and round; m r o, medium bunch, roundish-oval berry; m r, medium bunch, round berry. *Color*,—b, black, or nearly so when fully ripe; r, reddish, or coppery-brownish red; g, greenish-white or yellowish. *Quality*,—g, good; v g, very good; b, best. *Use*,—T, table; M, market; W, wine. *Season*,—E, early; M, medium; L, late. *Origin*,—the species to which each variety belongs; Lab, *Vitis Labrusca;* Æst, *æstivals;* Rip, *Riparia*; Vulp, *Vulpina*. An X after one of the species denotes a cross with a variety of some other species. Hyb, hybrid between a foreign variety and one of the native species.

| Number. | Names. | Description. | | | | | | | Value. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Size. | Form. | Color. | Quality. | Use. | Season. | Origin. | North. | South. |
| 1 | Agawam, *Rogers' No. 15* | l | s r o | r | g | T M | M | Hyb | .... | * |
| 2 | Brighton | l | r | d r | v g | T | E | Hyb | .... | † |
| 3 | Concord | l | l r | b | g | T M W | M | Lab | .... | * |
| 4 | Delaware | s | s r | r | b | T M W | M | ? X | .... | * |
| 5 | Diana | m | s r o | r | v g | T M | L | Lab | .... | — |
| 6 | Green Mountain | .... | ..... | .... | .... | ..... | ..... | ..... | ... | † |
| 7 | Hartford, *Hartford Prolific* | l | m r o | b | g | M | E | Lab | .... | * |
| 8 | Iona | m | m r o | r | b | T M W | L | Lab | .... | — |
| 9 | Moore's Early | l | r | b | g | T M | V E | Lab | .... | ** |
| 10 | Niagara | l | r | w | g | T M | M | Lab | .... | † |
| 11 | Salem, *Rogers' No. 52* | l | r | b | g | M | M | Hyb | .... | * |
| 12 | Wilder, *Rogers' No. 4* | l | l r | b | v g | T M | M | Hyb | .... | * |
| 13 | Worden | l | r | b | g | T M | E | Lab | .... | * |
| 14 | Wyoming | .... | ..... | .... | .... | ..... | ..... | ..... | .... | † |

## QUINCES.

ABBREVIATIONS.—*Size*,—l, large; m, medium; s, small; v, very. *Form*,—o, oblate; ob, obtuse: p, pyriform; r, roundish. *Color*,—g, greenish; y, yellowish. *Quality*,—h, half tender; t, tender. *Use*,—K, kitchen; M, market. *Season*,—E, early; L, late. *Origin*,—Am, American; F, foreign.

| Number. | Names. | Description. | | | | | | | Value. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Size. | Form. | Color. | Quality. | Use. | Season. | Origin. | North. | South. |
| 1 | Alaskan | .... | ..... | .... | ... | ..... | ..... | ..... | .... | † |
| 2 | Angers | v l | r obp | y | t | M K | E L | F | .... | * |
| 3 | Apple or Orange | l | r | y | h t | M K | E L | ..... | .... | * |

## PEARS.

ABBREVIATIONS.—*Size*,—s, small; l, large; m, medium. *Form*,—p, pyriform; r o p, roundish obtuse pyriform: r a p, roundish acute pyriform; ob p, obtuse pyriform; ob o p, oblong obtuse pyriform; r, roundish; r ob, roundish obtuse. *Color*, —y g, yellow or yellowish green with a red or russet red cheek; y r, yellow and russet; y, when mostly yellow or yellowish. *Quality*,—g, good; v g, very good; b, best. *Use*,—F, valuable family dessert: K M, kitchen and market; F M, family and market. *Season*,—S, summer; L S, late summer; A, autumn; E A, early autumn; W, winter. *Origin*,—Eng, English; Am, American; F, Flemish; B, Belgium; H, Holland.

| Number. | Names. | Description. | | | | | | | Value. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Size. | Form. | Color. | Quality. | Use. | Season. | Origin. | North. | South. |
| 1 | Admiral Farragut | l | r a p | y g | g | K M | A | Am | .... | † |
| 2 | Angoulême, *Duchesse d' Angouleme* | l | ob o p | y | v g | F M | A | F | .... | ** |
| 3 | Anjou, *Beurre d' Anjou* | l | ob p | y g | v g | F M | L A | F | .... | ** |
| 4 | Bartlett | l | ob o p | y | v g | F M | L S | Eng | .... | ** |
| 5 | Bosc, *Beurre Bosc* | l | p | y r | b | F M | L A | B | .... | * |
| 6 | Boussock, *Doyenne Boussock* | l | r o p | y r | v g | F M | E A | B | .. | * |
| 7 | Buffum | m | r o p | y g | g | M | E A | Am | .... | * |
| 8 | Clairgeau, *Beurre Clairgeau* | l | p | y r | g | M | L A | F | .... | * |
| 9 | Clapp Favorite | l | ob o p | y g | v g | F M | S | Am | .... | ** |
| 10 | Diel, *Beurre Diel* | l | r ob p | y r | v g | F M | L A | B | .... | * |
| 11 | Easter Beurre | l | r ob p | y r | v g | F | W | B | .... | † |
| 12 | Eastern Belle | m | ob p | y r | v g | F | E A | Am | .... | * |
| 13 | Flemish Beauty | l | r ob p | y g | v g | F M | E A | B | .... | — |
| 14 | Fulton | s | r ob | y r | v g | F | A | Am | .... | * |
| 15 | Giffard | m | p | y g | v g | F M | S | F | ... | * |
| 16 | Goodale | l | ob p | y | v g | F M | A | Am | .... | † |
| 17 | Hardy, *Beurre Hardy* | l | ob p | y g | v g | F M | E A | ..... | .... | * |
| 18 | Howell | l | r p | y g | v g | F M | E A | Am | .... | * |
| 19 | Indian Queen | l | p | y g | g | K M | A | Am | .... | † |
| 20 | Josephine of Malines | m | r ob p | y r | v g | F M | W | F | ... | * |
| 21 | Lawrence | m | r o p | y r | v g | F M | W | Am | .... | ** |
| 22 | Louise Bonne of Jersey | l | ob p | y g | v g | F M | E A | F | .... | ** |
| 23 | Lucrative, *Belle Lucrative* | m | ob r | y g | b | F | E A | Fl | .... | ** |
| 24 | McLaughlin | l | ob p | y g | v g | F M | W | Am | .... | * |
| 25 | Nickerson | l | ob p | y g | g | F M | A | Am | * | † |
| 26 | Onondaga, *Swan's Orange* | l | ob p | y g | v g | F M | L A | Am | .... | * |
| 27 | Rostiezer | s | p | y g | b | F | S | .... | .... | * |
| 28 | Seckel | s | r | y g | b | F M | A | Am | .... | * |
| 29 | Sheldon | m | r | y g | v g | F M | A | Am | .... | ** |
| 30 | Souvenir du Congres | l | p y r | y g | v g | F M | S | F | .... | † |
| 31 | Summer Doyenne, *Doyenne d' Ete* | s | r o p | y g | v g | F | S | B | .... | * |
| 32 | Superfin, *Beurre Superfin* | m | r p | y r | v g | F | A | F | .... | * |
| 33 | Tyson | m | r a p | y g | b | F | S | Am | .... | * |
| 34 | Vicar, *Vicar of Winkfield, Le Cure* | l | p | y | g | K M | W | F | .... | * |
| 35 | Winter Nelis | m | ob p | y r | b | F M | W | B | .. | * |

## PLUMS.

ABBREVIATIONS.—*Size*,—l, large; m, medium; s, small. *Form*,—o, oval; ob, obovate; r, roundish. *Color*,—g, greenish; p, purplish; r, reddish; y, yellow. *Quality*,—g, good; v g, very good; b, best. *Use*,—F, family; M, market. *Season*,—E, early; L, late; M, medium. *Origin*,—Am, American; F, foreign.

| Number. | Names. | Description. | | | | | | | Value. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Size. | Form. | Color. | Quality | Use. | Season. | Origin. | North. | South. |
| 1 | Abundance | m | r o | p | g | F M | M | Jap | .... | † |
| 2 | Bavay, *Bavay's Green Gage* | l | r | g y | b | F | L | F | ... | ** |
| 3 | Bleeker Gage | m | r o | y | v g | F M | M | Am | ... | * |
| 4 | Burbank | m | r | p | g | F M | M | Jap | .... | † |
| 5 | Bradshaw | l | o ob | r p | g | M | M | Am | .... | * |
| 6 | Coe Golden Drop | l | o | y r | v g | F M | L | F | .... | * |
| 7 | Columbia | l | r | p | g | M | M | Am | .... | * |
| 8 | Damson | s | o | p | g | M | L | Am | * | * |
| 9 | De Soto | m | r o | y r | v g | F M | M | Am | † | † |
| 10 | Duane Purple | l | o | r p | g | F M | E | Am | .... | * |
| 11 | Forest Garden | m | r | r | v g | F M | E | Am | † | † |
| 12 | Green Gage | s | r | g y | b | F | M | F | * | * |
| 13 | Huling, *Huling Superb* | l | r o | g y | g | F M | M | Am | .... | * |
| 14 | Imperial Gage | l | o | g y | b | F M | M | Am | . | ** |
| 15 | Italian Prune, *Fellemburg* | m | o | p | g | F M | M | F | ... | * |
| 16 | Jefferson | l | o | y r | b | F M | M | Am | ... | * |
| 17 | Lombard | m | r o | r p | g | M | M | Am | — | * |
| 18 | McLaughlin | l | r | y r | b | F M | M | Am | .... | ** |
| 19 | Moore Arctic | m | r o | p | g | F M | M | Am | ** | * |
| 20 | Penobscot | .... | .... | .... | .... | .. ... | .... | Am | .... | * |
| 21 | Pond, *Fonthill* | l | o | y r | g | M | M | F | .... | * |
| 22 | Purple Gage | m | r | p | v g | F M | M | ..... | .... | * |
| 23 | Quackenboss | l | r | p | g | M | M | Am | .... | * |
| 24 | Rollingstone | .... | .... | .... | .... | ... . | .... | Am | † | † |
| 25 | Shropshire Damson | s | o | p | g | F M | L | Eng | .... | * |
| 26 | Smith Orleans | l | o | r p | v g | F M | M | Am | * | * |
| 27 | Washington | l | r o | g y | v g | F M | M | Am | .... | * |
| 28 | Wolf | m | o | y r | g | F M | M | Am | † | † |
| 29 | Yellow Egg, *White Magnum Bonum* | l | o | y | g | F M | M | ..... | .... | * |

1 and 4 Japanese varieties which can succeed only in the southern parts of the State. 9, 11, 24 and 28, improved varieties of *Prunus Americana*, the native "horse plum" or "pomegranate." 19, the most popular variety for Aroostook county.

## RASPBERRIES.

ABBREVIATIONS.—*Size*,—l, large; m, medium; s, small; v, very. *Form*,—c, conical; o, obtuse; r, roundish. *Color*,—b, black; p, purplish; r, reddish; y, yellow. *Quality*,—b, best; g, good; v, very. *Use*,—M, market; F, family. *Season*,—E, early; L, late: M, medium. *Origin*,—Am, American; F, foreign.

| Number. | NAMES. | DESCRIPTION. | | | | | | | VALUE. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Size. | Form. | Color. | Quality. | Use. | Season. | Origin. | North. | South. |
| | SUB-SECTION I.—RUBUS IDÆUS. | | | | | | | | | |
| 1 | Clarke | m | r | r | g | F M | E | Am | .... | * |
| 2 | Herstine | l | ob c | r | v g | F M | M | Am | .... | † |
| 3 | Knevett | l | ob c | r | b | F | M | F | ... | — |
| 4 | Orange, *Brinckle's* | l | c | y | b | F | M | Am | .... | — |
| | SUB-SECTION II.—R. NEGLECTUS. | | | | | | | | | |
| 1 | Philadelphia | m | r | p | g | M | M | Am | .... | — |
| 2 | Shaffer | v l | r | p | g | F M | M | Am | .... | * |
| | SUB-SECTION III.—R. OCCIDENTALIS. | | | | | | | | | |
| 1 | Gregg | v l | r | b | g | F M | M | Am | .... | ** |
| 2 | Hilborn | .... | ..... | .... | .... | ..... | ..... | ..... | .... | † |
| 3 | MacCormick, *Mammoth Cluster* | m | ob c | b | v g | F M | L | Am | .... | * |
| 4 | Nemeha | .... | ..... | .... | .... | ..... | ..... | ..... | .... | † |
| 5 | Souhegan | m | r | b | g | F | E | Am | ... | * |
| 6 | Tyler | m | r | b | v g | F M | E | Am | .... | * |
| | SUB-SECTION IV.—R. STRIGOSUS. | | | | | | | | | |
| 1 | Cuthbert, *Queen of the Market* | l | r o | r | g | F M | M | Am | .... | ** |
| 2 | Golden Queen | l | r c | y | v g | F M | M | Am | .... | ** |
| 3 | Hansell | m | r c | r | v g | F M | V E | Am | .... | † |
| 4 | Marlboro | l | r c | r | g | F M | M | Am | .... | * |
| 5 | Turner | m | r | r | g | F M | E | Am | .... | * |

## STRAWBERRIES.

ABBREVIATIONS.—*Size*, l, large; s, small; m, medium. *Sex*,—B, bisexual; P, pistillate; P B, nearly pistillate. *Color*,—d c, deep crimson; d s, deep scarlet; b s, bright scarlet; w t, whitish tinted with red; l c, light crimson. *Form*,—r c, roundish conical; o c, obtuse conical or coxcomb form; c, conical; r, roundish; r o c, roundish obtuse conical. *Flesh*,—s, soft; f, firm; m, medium. *Season*,—E, early; M, medium; L, late; E L, early to late. *Origin*,—Am, American; F, foreign.

| Number. | Names. | Description. | | | | | | | Value. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Size. | Sex. | Color. | Form. | Flesh. | Season. | Origin. | North. | South. |
| 1 | Beeder Wood | .... | .... | ..... | ..... | .... | ..... | ..... | .... | † |
| 2 | Beverly | .... | .... | ..... | ..... | .... | ..... | ..... | .... | † |
| 3 | Boynton | .... | ... | ..... | ..... | .... | ..... | ..... | .... | † |
| 4 | Bubach No. 5 | .... | P | ..... | ..... | .... | ..... | Am | * | * |
| 5 | Burt | .... | .... | ..... | ..... | ... | ..... | ..... | .... | † |
| 6 | Charles Downing | l | B | d s | c | f | M | Am | * | * |
| 7 | Col. Cheney | l | P | b s | o c | f | M | Am | ... | * |
| 8 | Crawford | l | B | b c | o c | m | M | Ohio | ... | † |
| 9 | Crescent | l | P | b s | r c | m | M | Am | ** | ** |
| 10 | Cumberland, *Cumberland Triumph* | v l | B | b s | r c | s | M | Am | .... | * |
| 11 | Gandy | .... | B | b r | c | f | ..... | Am | .... | † |
| 12 | Haverland | l | P | r s c | o c | m | M | Am | .... | ** |
| 13 | Jessie | v l | B | b s | r c | m | M | Am | .... | * |
| 14 | Manchester | l | P | s | o c | f | M | Am | .... | * |
| 15 | May King | .... | .... | ..... | ..... | .... | ..... | ..... | .... | * |
| 16 | Michel's Early | .... | .. | ..... | ..... | ... | ..... | ..... | .... | † |
| 17 | Miner, *Miner's Great Prolific* | v l | B | c | r c | m | M | Am | .... | * |
| 18 | Monmouth | .... | .... | ..... | ..... | .... | ..... | ..... | .... | † |
| 19 | Mrs. Cleveland | .... | .... | ..... | ..... | .... | ..... | ..... | .... | † |
| 20 | Parker Earle | l | B | b r | l c | f | M | Tex | .... | † |
| 21 | Pearl | m | B | d r | o c | f | M | Am | .... | † |
| 22 | Sharpless, *Ontario* | v l | B | b r | o c | f | M | Am | .... | * |
| 23 | Triomphe de Gand | l | B | l c | o c | f | M | F | .... | * |
| 24 | Warfield | m | P | d r | c | f | M | Ill | .... | † |
| 25 | Wilson, *Wilson's Albany* | l | H | d c | r c | f | E L | Am | .... | * |

## Select Varieties.

### 1. *For the Northern Counties.*

Apples—*Summer and Autumn.* Yellow Transparent, Oldenburg, Alexander, Lady Elgin crab. *Winter.* Dudley's Winter (North Star,) Fameuse, Hayford Sweet, Wealthy.

Pears—Fulton, Eastern Belle, Nickerson, Tyson, Vermont Beauty.

Plums—Moore Arctic, Green Gage, Smith's Orleans, and possibly De Soto, Forest Garden and Wolf.

Small Fruits—Agawam blackberry; Cuthbert, Turner and Tyler raspberries; Fay and White Grape currants; Downing and Houghton gooseberries.

### 2. *For the Southern Counties.*

Apples—*Summer and Autumn.* Yellow Transparent, Oldenburg, William's Favorite, Dyer (Pomme Royal,) Gravenstein, Fall Harvey, High Top Sweet, Munson Sweet, Ramsdell Sweet.

*Winter*—Baldwin, Fameuse, Granite Beauty, Hubbardston, Jewett Red (Nodhead), Milding, Mother, Northern Spy, Rhode Island Greening, Rolfe, Roxbury Russet, Talman Sweet, Wealthy, Yellow Bellflower.

Pears—Clapp Favorite, Bartlett, Louise Bonne of Jersey, Sheldon, Angouleme, Anjou, Lawrence.

Plums—Bavay, Imperial Gage, Lombard, McLaughlin.

Cherries—Black Heart, Downer's Late, Governor Wood, Early Richmond, English Morello.

Raspberries—Cuthbert, Golden Queen, Shaffer, Gregg.

Blackberries—Agawam, Snyder.

Currants—Fay, Prince Albert, Versaillaise, Victoria, White Grape.

Gooseberries—Downing, Smith, Whitesmith.

Grapes—Green Mountain, Hartford, Moore's Early, Worden.

Strawberries—Bubach No. 5, Crescent, Haverland, Sharpless, Wilson.

### * 3. *Select Apples for Home Use.*

*Summer and Autumn*: Yellow Transparent, Oldenburg, Dyer, Gravenstein, High Top Sweet, Munson Sweet.

*The varieties here suggested are known by the writer to be of value for the purposes named in certain parts of the State. There may be some sections where local conditions would render other sorts more valuable.

*Winter*—Fameuse, Hubbardston, Mother, Northern Spy, Rhode Island Greening, Rolfe, Roxbury Russet, Winter Sweet Paradise, Talman Sweet.

* *4. Select Apples for Market.*

*Summer and Autumn*: Oldenburg, Gravenstein, High Top Sweet.

*Winter*—Baldwin, Ben Davis, Hubbardston, Rhode Island Greening, Roxbury Russet, Talman Sweet. Yellow Bellflower.

*5. Apples Tried and Found Wanting in the Northern Counties.*

Baldwin, Ben Davis, Black Oxford, Blue Pearmain, Fall Queen, (Haas), Gravenstein, Grimes Golden, High Top Sweet, Manu, Northern Spy, Peabody Greening. Porter, Rhode Island Greening, Rolfe, Sops-of-Wine, Talman Sweet, Tompkins King, Williams (Favorite), Yellow Bellflower.

*See note on page 143.

# Report of Botanist and Entomologist.

Prof. F. L. HARVEY.

*Professor W. H. Jordan:*

DEAR SIR—I have the honor to submit herewith my sixth annual report as Botanist and Entomologist for the Experiment Station. The demand for information about injurious fungi, weeds, forage plants and injurious insects is increasing. More letters of inquiry were received the past season than ever before. Many of these letters were about insects and fungi already considered and figured in previous reports and from parties who must have had access to the Station Reports. It is apparently less trouble to send specimens to the Station for examination and positive determination than to look them up in the reports. Extensive and carefully detailed correspondence must form an important feature of Station work. Such letters are usually answered by referring to the published accounts in the Station Reports. Specimens when new to the State are reported upon in detail, and if of sufficient interest are considered and figured in the annual report. Below will be found tabulated and considered the most important plants and insects that have been studied the past season The season has not been marked by the ex reme ravages of any insect, or the widespread prevalence of any species of fungus, though some of those that gave trouble last season have increased and a few have been added to the list of our State pests.

PEAR-LEAF BLIGHT seems to be spreading in the western part of the State in the vicinity of Portland. Any whose pears crack open in ripening will do well to read the article on this disease in Experiment Station Report, 1892, page 109. The BEAN ANTHRACNOSE, a disease that causes brownish spots upon snap beans, (especially the white-podded varieties), was quite prevalent the past season. TOMATO ANTHRACNOSE, a fungus attacking ripening and ripe tomatoes was abundant in the Station garden and elsewhere in the State. The BEET SCAB, a disease causing warty excrescences upon beet roots, and said to be produced by the same fungus as POTATO SCAB was abundant in the Station garden and other places in the State. The CLOVER RUST was unusually bad (especially on second-growth clover,) about Orono. A new tomato disease causing depressed dark

patches upon ripened tomatoes did considerable damage to the Station tomato crop. The STRAWBERRY SEPTORIA was very abundant upon Station strawberries. The ORANGE HAWK-WEED still spreads. As it seeds before harvest, spreads by runners at the roots and is perennial it will yield to nothing but the spade and hoe, and the earlier attended to the less trouble. The ARISTATE PLANTAIN, a near relative of the ENGLISH PLANTAIN has made its appearance in the State. In response to an enquiry regarding wild rice we have learned that it is plentiful in the State.

THE FALL CANKER WORM is gradually spreading. Besides apparently holding its own in known localities several new localities have been reported the past season. This species is sometimes accompanied by the LIME-TREE WINTER-MOTH an insect similar in its habits but checked by spraying like the CANKER-WORM.

THE ANGOUMOIS GRAIN MOTH was found in great numbers in boxes of *Shaker Pop Corn* offered for sale in Orono. This is one of the worst grain insects. The grain exhibits at the World's Fair were badly infested with it. It is capable of doing much damage to stored grain and its spread in the State would be a misfortune.

THE STALK BORER, (*Gortyna nitela*, GUEN.,) and THE BLACK CANTHARIS, (*Cantharis atrata*,) were both reported as doing damage to potatoes; the former boring into the stalks, the latter in great numbers feeding upon the foliage.

THE RED-HUMPED APPLE-TREE CATERPILLAR seems to be increasing in the State. It was reported from a new locality this season and we found it also in the Station orchard, probably introduced on nursery stock.

THE APPLE-LEAF BUCULATRIX, (*B. pomifoliella*, Clemens.) A small moth, the larva of which skeletonizes the leaves of apple trees was reported as doing considerable damage. This insect has not been noticed before.

Specimens of pears received from F. Frank Jones, Portland, bore the characteristic cuts of the PLUM CURCULIO. Some of the fruits had five incisions and were badly dwarfed and distorted.

THE STRIPED SQUASH BEETLE, a very common garden pest seems to have been unusually abundant the past season. Thick planting and then thinning, as the plants get older; protecting the seedlings by boxes or half hoops and netting, or even hand picking the beetles will usually insure a good stand of cucurbitaceous plants.

Mr. C. A. Wood of Searsport sent us a species of ROVE BEETLE, *Ancyrophorus planus*, and THE FOUR-SPOTTED PITHYOPHAGUS, *P. 4-guttatus*. Both were accused of destroying the kernels of sweet corn at the top of the ear. Ears of damaged corn accompanied the accused. We were able to acquit the above beetles as the corn showed the unmistakable work of the CORN WORM which was considered in our last report on P. 119. The true culprits, full fed, had probably crawled away to transform. The above insects were in the corn to feed upon the sugary and starchy matter that flowed from the broken kernels.

THE WHITE GRUB or larva of the MAY BEETLE, *Lachnosterna fusca*, has been doing much damage to grass lands in the vicinity of Bridgton. As there is no certain remedy known for this insect it would be advisable to do some field work upon it and try the most hopeful remedies suggested by entomologists and prove their value or worthlessness.

THE PEAR BLIGHT BEETLE working in the limbs of apple trees and boring the wood full of small channels is a new injurious insect to the State.

We reeceivd specimens from two widely separated localities so it must be widespread. Its presence can be detected by small shot-like holes in the bark. It attacks healthy trees and there is no remedy but to cut the branches infested and burn them.

The BEAN WEEVIL spoken of in our last report is considered and illustrated in this. The HORN FLY was quite abundant in some localities. It is migrating eastward and was quite abundant at Hudson and other localities in the Penobscot valley this season.

The CARROT FLY, *Psila rosæ*, was received from Mr. C. H. Morrell, Pittsfield. It was found infesting stored carrots. This is a European insect never before detected in the United States. The carrots were literally alive with maggots.

Beets in this region were badly infested by a species of *Anthomyia* or BEET FLY, the larvæ of which eat the pulp from the leaves, leaving the epidermis. The eaten spots are clear whitish and in them the maggots can often be seen between the epidermi.

THE CURRANT PLANT LOUSE, *Aphis ribes*, L. has been doing damage to gooseberries in Aroostook and Piscataquis counties the past season, destroying the foliage and causing a second growth of small leaves.

THE APPLE MAGGOT, *Trypeta Pomonella*, Walsh, still is doing much damage in Maine as well as in adjoining states, if we can judge from the demand for our article on this insect, published in the Station Report for 1889. We received a long newspaper article from a New Hampshire correspondent, which he had written to give the fruit growers of his state the life history of this pest. The article was accompanied by specimens in the "*long-winged*" stage of their development, graphically described by the writer. The specimens were a species of ICHNEUMON which does not even belong to the same order as Trypeta, which is a *two winged* fly. The article was full of other errors. We notice this merely to warn farmers and fruit growers against articles upon technical subjects by non-professionals. To trace the life history of an insect requires great care, and a knowledge of insect forms that can not possibly be obtained except by long experience.

In the above mentioned article at least *three insects* belonging to *different orders* were regarded as *stages* in the life history of *Trypeta* and *none of them pertained to that insect*. The best way is to send injurious insects to the professional entomologist. *Absolute* identification of a p st is the first thing necessary in coping with it.

THE CHINCH BUG still continues to do damage to meadow lands in the vicinity of Fryeburg. It will be well to do some field work in that region another season to learn the extent of the infested district and gain any information that will enable us to suggest remedial measures.

*Tetranychus 2-maculatus*, Harvey, was reported from Piscataquis county the past season. While we were in Chicago, during July, specimens of this mite were submitted to us for examination. They came from a greenhouse near Chicago, showing this pest is widely distributed.

### DIRECTIONS FOR SENDING SPECIMENS.

Regardless of the careful directions given in previous reports for sending insects, several specimens were received the past season, in envelopes or fragile paper boxes and when they arrived were crushed almost beyond recognition. Other packages came without the name and address of the sender upon them. Insects should *always* be sent in wooden or tin boxes and some of the food plant or injured material enclosed. Notes upon the habits of the insect

should accompany the specimens, and the sender's name and address should be upon the package even if a separate letter is written. We sometimes receive several packages the same day and if not plainly marked we are unable to tell from whom they come.

Directions for sending specimens will be found in the Annual Report of the Experiment Station, 1888, p 194, or in Maine Agricultural Report, 1888, p. 158. Correspondence regarding injurious insects and fungi is invited. Insects and plants will be named, and when injurious, remedies suggested. It is to the interest of farmers to detect injurious insects and fungi before they become established, so that remedial measures can be adopted before the pests are beyond control. As the Entomologist's duties prevent him from going much about the State, it is largely through correspondence that the Station learns of insects doing injury in the State.

## REMARKS.

The cuts and plates to illustrate this Report were obtained from the following sources: From the Department of Agriculture, Washington, D. C.; the plate of Plantago Patigonica, cuts of the Angoumois Grain Moth, and cuts of the May Beetle; from J. B. Lippincott & Co.; cuts of the Lime-tree Winter-moth, the Apple-leaf Bucculatrix, the Disippus Butterfly and the Pear-blight Beetle; from Prof. A. E. Popenoe, cuts of the Bean and Pea Weevils; cuts of the bean Anthracnose and Carrot Fly are from original drawings made by the writer.

## PLANTS REPORTED AND EXAMINED—1893.

| No. | Common Name. | Technical Name. | From Whom Received. | Remarks. |
|---|---|---|---|---|
| 1 | Hair Mold | *Phycomyces mitens* | Chas. P. Kitridge, Milo | On excrement. See Experiment Station Report, 1892, p. 111. |
| 2 | Pear-leaf Blight | *Entomosporium maculatum*, Lev. | T. Frank Jones, Portland | Attacking the leaves and fruit of pear trees. See Experiment Station report, 1892, p. 109. |
| 3 | Bean Anthracnose | *Colletotrichium Lyndemuthianum*, (S and M) (B and Cav.) | Eugene T. Perkins, Kennebunkport<br>Prof. W. H. Jordan, Orono | Causing brown spots on the pods of beans. |
| 4 | Anthracnose of the Tomato | *Colletotrichum phomoides*, Sacc. | F. L. Harvey, Orono | Causing ripe rot on tomatoes. |
| 5 | Beet and Potato Scab | *Oospora scabies*, Thaxter | F. L. Harvey, Orono | Causing warty excrescences on beet roots and scab on potatoes. |
| 6 | Orange Hawkweed | *Hieracium aurantiacum*, L. | E. W. Dutton, New Sharon | Coming uninvited into fields. |
| 7 | Aristate Plantain | *Plantago Patigonica* var. *aristata*, Gray. | Mrs. A. M. Pikes, East Madison | In oat field. |

## INSECTS REPORTED AND EXAMINED—1893.

| No. | Common Name. | Technical Name. | From Whom Received. | Remarks. |
|---|---|---|---|---|
| 1 | Fall Canker Worm | *Anisopteryx pometaria*, Harris | B. Walker McKeen, Augusta, Chas. S. Pope, Manchester, W. F. Hilt, Warren, Samuel Milliken, W. Scarboro | Eggs on apple trees; wingless females on side of house; larvæ feeding on foliage of apple trees. |
| 2 | The Angoumois Grain Moth | *Gelechia cerealella*, L | F. L. Harvey | Found in *Sure Pop* Shaker Corn in a store in Orono. |
| 3 | The Stalk Borer | *Gortyna nitela*, Guen | H. B. Whipple, Bingham | Boring potato stalks. |
| 4 | The Io Emperor Moth | *Hyperchiria Io* (Linn) | F. H. Parlin, East Winthrop | |
| 5 | The Lime-tree Winter Moth | *Hybernia tillaria*, Harris | F. W. Hilt, Warren | With the females of the Fall canker worm crawling on the side of a house. |
| 6 | The Red-humped Apple-tree Caterpillar | *Œdemasia concina*, (Sm. and Abb.) | F. L. Harvey, College orchard, Miss May Thurlow Farrow, Centre Belmont | Feeding on foliage of apple trees. See Station Report, 1890, page 135. |

| | | | | |
|---|---|---|---|---|
| 7 | THE GREAT AMERICAN TIGER-MOTH | *Arctia Americana*, Pack. | D. H. Knowlton, Farmington | This is a rare moth in Maine. Of no special economic importance. |
| 8 | THE APPLE-LEAF BUCCULATRIX | *Bucculatrix Pomifoliella*, Clemens. | D. P. Boynton, Monmouth | Injuring the foliage of apple trees. |
| 9 | THE DISIPPUS BUTTERFLY. | *Limenitis disippus*, Godt. | Fred B. Pike, Cornish | Feeding on willows. |
| 10 | THE PLUM CURCULIO | *Conotrachelus nenuphar*, Herbst | F. Frank Jones, Portland | Several varieties of pears showing the cuts of the plum curculio. |
| 11 | THE STRIPED SQUASH BEETLE | *Diabrotica vittata*, Fabr. | J. W. Black, Searsport | Obtained from Mr. C. A. Woods. |
| 12 | ROVE BEETLE | *Ancyrophorus planus*, Lec. | J. W. Black, Searsport, from C. A. Woods, Searsport | Feeding on the starchy matter of ears of corn that had been injured by the Corn Worm. See Experiment Station Report, 1893, p. 192. |
| 13 | FOUR SPOTTED PITHYOPHAGUS. | *Pithyophagus 4-guttatus* | J. W. Black, Searsport, from C. A. Woods, Searsport | With the above feeding upon the exuded milk of corn attacked by the Corn Worm. |
| 14 | THE WHITE GRUB OR MAY BEETLE | *Lachnostema fusca*, Trohl | J. L. Wale, Bridgton | Destroying meadows. |
| 15 | BLACK CANTHARIS. | *Cantharis atrata* | H. B. Gray, Blue Hill | Feeding on potato vines. |
| 16 | BEAN WEEVIL | *Bruchus obtectus*, Say | Samuel Libby, Orono | Working in stored beans. |
| 17 | THE PEAR BLIGHT BEETLE | *Xyleborus pyri*, Peck,= *Xyleborus dispar*, Fabr. | J. M. Allen, North Sedgwick, Dr. Twitchell, Augusta | Boring in the limbs of apple trees. |
| 18 | THE HORN FLY | *Haematobia serrata* | A. T. Wing, North Fayette | See Experiment Station Report, 1892, p. 131. |
| 19 | THE CARROT FLY | *Psila rosae*, Fab | C. H. Morrell, Pittsfield | Larvæ badly infesting stored carrots. New to United States. |
| 20 | THE BEET OR MANGOLD FLY | *Anthomyia betae*, Curtis | O. T. Goodrich, Orono, F. L. Harvey, Orono | Feeding on the pulp of beet leaves reducing them to a dry papery skin. |
| 21 | OYSTER-SHELL BARK-LOUSE | *Mytilaspis pomorum*, Bouchè | Miss Georgine V. Wilbur, Phillips | On apple trees. See Experiment Station Report, 1888, p. 157. |
| 22 | THE CURRANT PLANT LOUSE | *Aphis ribis*, L | Chas. P. Kittredge, Milo<br>Delano Moore | Attacking gooseberry leaves.<br>Causing clusters of second growth leaves. |
| 23 | THE COTTONY MAPLE SCALE | *Pulvinaria innumerabilis*, Rathvon | C. M. Randlette, Richmond | On maple leaves. |

## BOTANY.

### Bean Anthracnose.

*Colletotrichium Lindemuthianum*, (Sacc & Magn ) Briosa & Cavara.

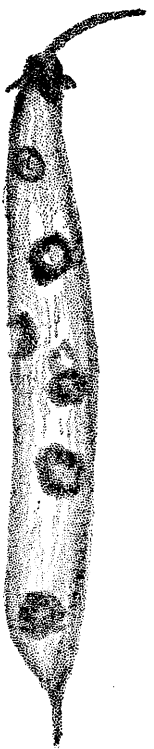


Fig. 1—Bean Anthracnose, pod showing pits formed by the disease (original)

The above disease of the bean has been quite common in gardens and fields about Orono for the past seven years and we presume it is prevalent throughout the State. It was unusually bad the past season, and specimens were received from distant localities and inquiries made regarding it. It is probably the worst disease of the bean and as its ravages can be largely controlled by proper precautions and treatment, the following consideration of the fungus may prove helpful in combating it. The Bean Anthracnose is a parasitic fungus attacking the stem, leaves and pods of both bush and pole beans, producing, especially on the pods, sunken brownish pits or spots surrounded by a reddish brown border. See Fig. 1. In the central part of these pits are little pinkish dots which are the spore masses that have exuded from below. The spores are held together by a gummy substance that is soluble in water and they may be liberated by dew or rain or excessive moisture and then are free to be blown by the wind to healthy plants, where they germinate and spread the disease. The disease is worst upon the white podded bush and pole beans but will also attack the more hardy varieties. The past season it was quite bad upon YELLOW EYES in the field. We lost the greater part of our garden crop of German Wax the past season, the pods becoming so covered with pits before they were large enough to pick as to be worthless. The effects of this disease are to lessen the stand when it destroys the seedlings; to dwarf the plants and make the pods swollen and when it spots the pods to render them unfit for snap beans, also to finally injure the bean in the pods. This disease may originate from infected seed or, we think, it may live over winter in the beans and pods that are left in the garden. When infected seed is planted the disease shows itself early in the seedlings. Much of the seed of German Wax beans offered for sale is infected. The past season fully half of the seedlings in our garden were affected

when they appeared above ground and not more than two-thirds of the seed came up. The remaining plants were dwarfed and early showed the presence of the disease. We procured new seed and made a second planting.

We have *purchased* our seed for the past seven years from that offered for sale by prominent dealers and have never had a crop free from the disease. It is common among gardeners to leave the bushes with the diseased pods upon them to rot on the ground, and to plant a second crop in the same place. We practice rotation of crops even in the garden with good results. It is a good practice to clear a garden in the fall of all refuse and carefully burn it. By doing this, fungi that live in the decaying organic matter are destroyed, along with hybernating insect pests. Beans should be planted on a light dry soil, in hills, or if in rows far enough apart to give good circulation of air. Moisture favors the growth of *Anthracnose* and other bean diseases. Care should be taken not to hoe beans after a rain or when the dew is on for the dirt that sticks to the leaves is liable to contain spores that will germinate and rapidly spread the disease. Professor Jordan showed us some badly spotted pods that were apparently free from the disease when purchased in the Orono market a day or two before.

If possible secure seed from your own, or a neighbor's field that was free from disease. It is hazardous to plant seed from an infested field. If obliged to take seed from a field that has been diseased pains should be taken to select pods from plants that have escaped the disease. All beans that show sunken pits, discolored patches, or are even wrinkled or blistered should be rejected. Diseased seedlings should be pulled as early as possible and removed from the field or burned, as the fungus will ripen its spores in the decaying plant. Some practice spraying beans with *Bordeaux mixture* early in the season, and claim that the fungus is controlled by it. The following precautions should materially lessen the disease:

I. Select good seed, rejecting all beans that seem at all unsound.

II. Should the disease appear in the young beans carefully destroy all affected seedlings.

III. If convenient spray early with Bordeaux mixture and repeat the application if needed before the pods form.

IV. Do not plant on ground that has borne an infected crop the past season.

V. Plant on a dry soil in hills or in rows far enough apart to admit air freely. Hoe when the ground and foliage are dry.

## Tomato Anthracnose.

*Colletotrichum phomoides*, Sacc.

This fungus appeared last fall in the station garden upon ripening and fully ripe tomatoes and did considerable damage. Tomatoes that were apparently sound developed the disease rapidly after they were gathered. This fungus is capable of doing much damage to the ripening crop and the ripe fruit can not be kept any time or marketed. We understand from Professor Munson that the disease has done damage elsewhere in the State. Professor Chester described this fungus as *C. lycopersici*, n. s p. in the Fourth Report of the Delaware Station, but in the Fifth Report of the same station, p. 80, 1892, he refers the fungus back to *C. phomoides*. Sacc. Our species is the same as the one considered by Professor Chester, as we sent specimens to him for comparison. He has kindly loaned us the fine cuts which are used to illustrate this article.

Professor Chester is of the opinion that the characters used by botanists to separate the genera *Colletotrichum and Gloesporium*, viz.: the presence or absence of setæ in the fruiting tufts, is evanescent. If this should be established the genus *Colletotrichum* would be merged into *Gloœsporium*. The investigations of Miss Southworth, Professor Halsted and Professor Chester indicate that several forms of *Gloesporium* separated as species on account of living on different host plants will have to be merged, or that there is a species of *Gloesporium one and the same*, capable of a wide range of parasitism and of producing *Anthracnose* on a variety of hosts. It looks as though careful laboratory methods would make havoc with the present nomenclature of fungi, by merging stages of the life history of forms and uniting species that have been separated on the principle, that each host harbors its peculiar parasites. The above is only of importance to mycologists. The characters and treatment are of more interest to the grower of tomatoes.

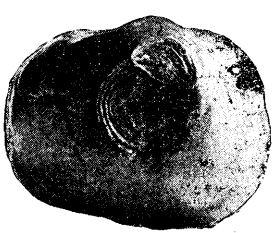


Fig. 2. Tomato. Affected by Anthracnose. Colletotrichum phomoides, Sacc.

CHARACTERS.

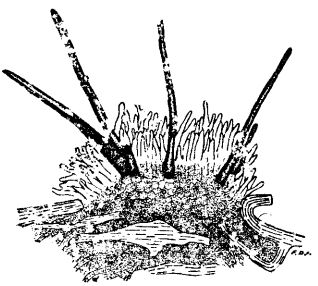


Fig. 3. A fruiting tuft of Colletotrichum phomoides, Sacc.Tomato-Anthracnose.

This disease makes its appearance upon ripening or fully ripe tomatoes upon the vines or develops rapidly upon gathered fruit. It appears on the tomatoes as rounded, sunken, discolored, wrinkled spots with a black centre. See Fig. 2. Contiguous spots become confluent forming diseased areas. An examination of these dark parts in the diseased areas, discloses numerous microscopic, oblong bodies, the *spores* of the fungus. See Fig. 4. These spores reproduce the disease. Prof. Chester found that these spores inserted under the skin of healthy tomatoes would rapidly cause the disease. Not being able to develop the disease by putting the spores on the unbroken skin of the green and ripe tomatoes would indicate that the disease is an internal parasite and can not be reached by spraying with Potassium Sulphide as is recommended by Mr. Bragg of the Oregon Station in a recent bulletin.

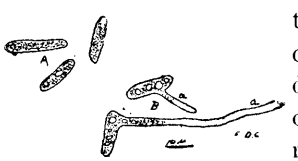


FIG. 4. A. Mature spore. B. Germinating spore of Colletotrichum phomoides, Sacc.

This disease opens the way for the attack of other species of fungi that hasten the decay.

Fig. 3. shows a cross section of one of the diseased spots highly magnified.

REMEDIES.

1. Spray the vines and young fruit with Potassium Sulphide (Liver of Sulphur)—formula.—Dissolve seven ounces of Potassium Sulphide in twenty-two gallons of water and apply with a spraying apparatus. As stated above this may not be useful for this disease but is regarded a remedy for external tomato fungi.

2. Gather all diseased vines and tomatoes and burn them.

3. Change the location of the tomato patch if the crop has been affected.

4. Do not take seed for planting from diseased tomatoes.

## Potato and Beet Scab.

*Oospora scabies*, Thaxter.

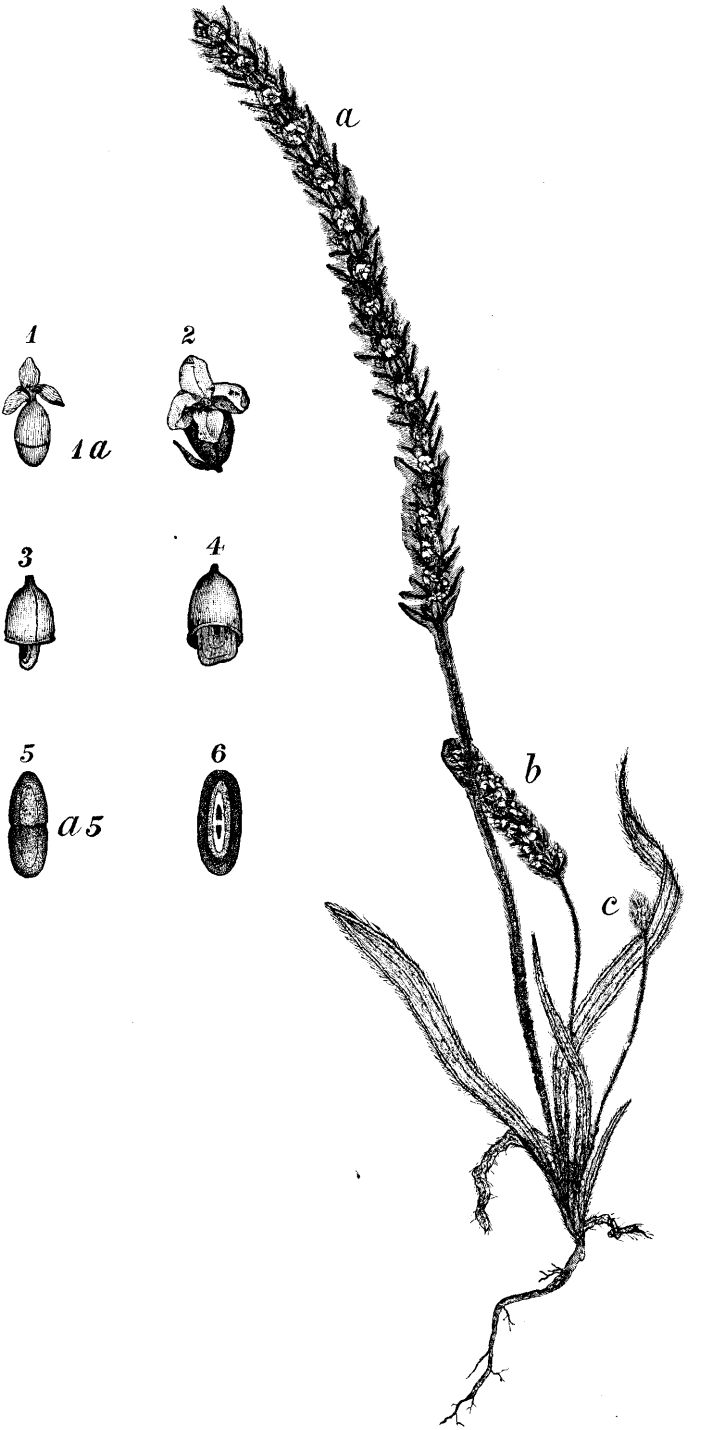
The scab of potatoes and beets has been quite prevalent the past season. The ordinary disease of potatoes and beets known as "scab" has been demonstrated by Dr. Thaxter to be due to the same fungus, the species named above. Now that the cause is known experiments for checking the disease can be conducted upon a rational basis. Professor Bolley exhibited at the World's Fair, Chicago, in the exhibit of the office of experiment stations, two jars of potatoes grown under similar conditions from scabby seed. One lot was treated with a dilute solution of corrosive sublimate and the other lot was untreated. The former lot was comparatively free from scab and well grown. The latter badly scabbed and dwarfed.

This would indicate that scabby seed may be the cause of the disease and that clean seed should be planted. It would also follow that scabby seed *treated* will produce much better potatoes than scabby seed *untreated*.

We feel positive that the disease cannot be controlled merely by planting clean seed. The last season we planted clean seed upon soil that had not grown potatoes for two years and raised a badly scabbed crop. It seems certain that this disease may live in the organic matter of the soil even more than one year or else has other hosts which have not been discovered upon which it maintains itself.

Will treating clean seed with corrosive sublimate give a better crop than clean seed untreated? If not we see no great use for it, for clean seed is usually obtainable.

Experiments to show the vitality of this fungus in soil not growing potatoes are desirable in order to learn whether a system of rotation may not clean the soil of the disease. Experiments should be conducted with clean seed upon grass lands in order to learn whether they are free from the fungus and settle the question whether newly turned grass land is better for potatoes. The study of fertilizers in relation to the introduction of this disease is important. Considerable more study upon the conditions of growth of this fungus is necessary.




WESTERN PLANTAIN.

*Plantago Patigonica, var. aristata*, Gray.

Figs. a, b and c show spikes in different stages of growth. Fig. 1. Back view of flower with calyx removed Fig. 2, front views with calyx and basal bract. Figs. 3 and 4, portions of capsules. Figs. 5 and 6, dorsal and ventral views of the seed.

## Western Plantain.

*Plantago Patigonica, var. aristata*, Gray.

Specimens of the above plant were received the past season from Mrs A. M Pikes, East Madison, Somerset county, and found growing in an oat field. This plant belongs to the *Order Plantaginaeæ* and is a near relative of the English Plantain considered in Experiment Station Report, 1890, p. 119. It was probably introduced with the seed. A few specimens were found growing on the college campus a year or two ago, introduced with grass seed, but they were not allowed to drop their seed. This plant is widely distributed in South and North America and in the West is a bad weed It presents a number of varieties besides the one named above. As it has become established on Martha's Vineyard and about Boston it would no doubt find a congenial home in Southern Maine, and this is written to call attention to it.

It can never become so bad a weed as its relative, the English Plantain, which has a strong foothold in some parts of Maine as it is an *annual* and could be eradicated in a single season if prevented from seeding. It may be known by the following description:

About a foot high, having usually several slender, naked, flowering stalks, which start from a cluster of leaves near the ground and bear on their top a close spike of flowers. The leaves are narrow, from three to five inches long, and bear a few nearly prominent parallel ribs. The variety under consideration is clothed with silky hairs and below each flower in the spike is a bract two or three times the length of the flower. The seed are boat-shaped as in the English Plantain. The seeds germinate the same season they ripen and the young plants mature the next season. It seeds profusely and a few plants would give it a good start. That the plant may be readily detected we reproduce from the United States Agricultural Report, 1888, plate XI, a cut of this weed, which is shown on the opposite page.

## ENTOMOLOGY.

### The Angoumois Grain Moth.

(*Gelechia cerealella*, Linn.)

Order Lepidoptera: Family Tineidæ.

The above insect was detected the past season as detailed below. Experiments made by Mr. F. M. Webster show that the New England climate will not destroy this pest but only check its depredations during cold weather. His experiments also show that the pest can be destroyed by a temperature of 130° Fah. kept up for four or five hours. The accompanying cuts show the life history of this moth, and the nature of its work. Below we give an article upon this insect contributed to the *Maine Farmer* by the writer.

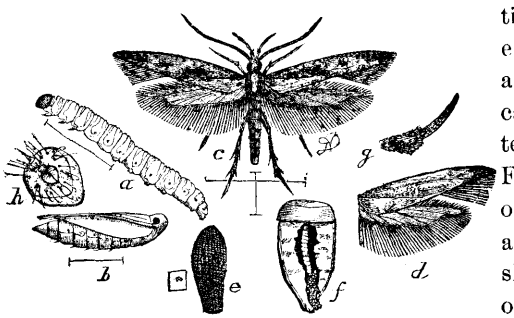



FIG. 5. Stages in the life history of the Angoumois Grain-moth, Gelechia cerealella, L.

*Editor Maine Farmer*: My attention was called a few days ago to the above insect found in great numbers in boxed Shaker rice

pop corn, put up by R. H. Wright, Albany, N. Y., and obtained for retail in Orono from a wholesale house in Bangor. As this is one of the most destructive insects known to wheat, oats, barley and Indian corn, it seems desirable that attention be called to it. Upon opening the boxes swarms of full fledged moths were found on the top of the corn, and made their escape into the room. The kernels of corn each contained small circular holes, and the most of the starchy matter was eaten, leaving only the shell. Mixed with the corn were a large number of dead moths. The party who found the moths let the live ones from several boxes of corn escape in the store, and when I told him it was a bad pest, he said they would all die, as the store was cold nights, and that he had burned all the corn. Though this insect was introduced from France, and has done more damage South than North, yet it is undaunted by a cold climate, and would be capable of doing much damage in stored grain in Maine. This insect was abundant in the grain exhibits at the World's Fair the past season. To burn the corn after the moths had all escaped was useless. That this insect may be better known, so that precautions can be taken against it, we give the following regarding its life history:

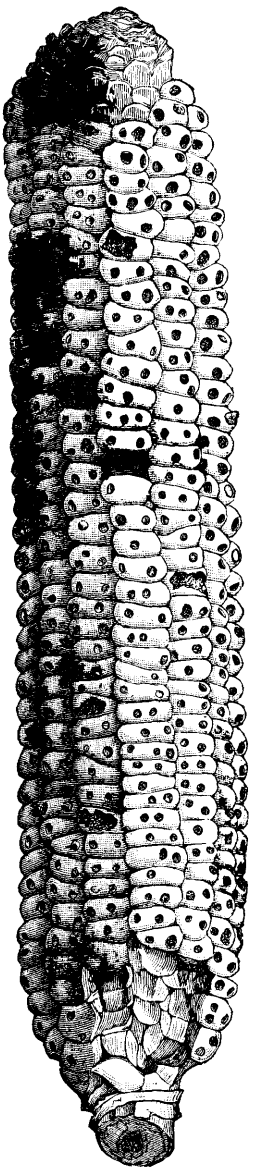


FIG. 6. Work of the Angoumois Grain-moth, Gelechia cerealella, L.

*Perfect insect*, a small moth with pointed wings, that spread between a half and three-quarters of an inch. Fore-wing pale shining ochre, with a grayish or brownish gray streak in the folds at the base, and a few scales of the same color toward the tip of the wing on the margin. Hind wings grayish ochre, and bearing a fringe of the same color on the border. *Larva*, a smooth, white worm, attacking the kernels, and consuming the inside, leaving the shell, and when full fed transforming to the *pupa* state in the grain, and finally emerging as a moth through a small hole in the kernel.

REMEDIES.

Bisulphide of carbon is now quite largely used to destroy insects infesting stored grains. In France they put the grain into an *insect* mill something like a peanut or coffee roaster, and raise the temperature of the grain high enough to kill the moths, eggs and larvæ. When the quantity of grain is small, it might be thrown into *hot water* or *heated*, and then fed to fowls. The work of this insect resembles in its effects that of the pea weevil, only the hole made by the moth is smaller, and so far as we know these insects never encroach upon each other's domain, the moth infesting the seeds of graminaceous plants, while the pea weevil is partial to legumes. Whether this corn was infested before it left the *Shakers*, or whether it lay in the wholesale houses in Bangor during the past summer, and was infested by moths of home production we do not know, but the moth is here *sure pop*, and we will have to look after it.

F. L. HARVEY.

ORONO, December 11th.

## THE LIME-TREE WINTER-MOTH.

*Hybernia Tillaria*, Harris.

Order Lepidoptera: Family Geometridae.

Among some specimens of female Canker-worms received from Mr. F. W. Hilt of Warren, Maine, were several wingless females of the above species. The specimens were found on the side of a house where they had probably crawled to lay their eggs or meet the males. As the Canker-worm is very bad in Maine and as this insect has similar habits they should be distinguished.

DESCRIPTION.

Eggs pale yellow, oval and marked with a net work of raised lines. They can be distinguished from the eggs of the Canker-worm by their color and form. (See Experiment Station Report, 1888, p. 167, Fig. 20.) The eggs are laid in similar situations as those of the Canker-worm. As the females of both species had

commenced to lay eggs in the box in which they were sent we concluded they were probably crawling up the side of the house to deposit the eggs.

*Larva*, when full grown, about an inch and a quarter long. Head dull red with a V-shaped mark on the front, yellow above and marked with many longitudinal black lines; the under side paler. Like the larva of the Canker-worm it is a *span* or *inch* worm but larger than the caterpillar of that species. The accompanying cut (Fig. 7) shows the larvae feeding and at rest.

FIG. 7. The Lime-tree Winter-moth, Hybernia tiliaria, Harris. Male, wingless female and larvae.

*Female Moth*, wingless, spider-like, yellowish white, sides marked with black dots, each ring of the body, excepting the last, bears two black dots, which has only one. Head black in front and the legs ringed with black. Antennae thread like. Ovipositor jointed and retractile. The larger size, the spotted back and black rings on the legs readily distinguish this from the wingless females of the fall and spring Canker-worms. Fig. 7 shows the wingless female about natural size.

*Male Moth*, expanse of fore wings an inch and a half. Color, rusty buff sprinkled with brownish dots and with two transverse brown wavy lines, the inner most distinct. Between the bands and near the anterior edge is usually a brownish dot. Hind wings paler. Body color of fore wings The antennæ are feathered. Like most of the moths of the inch worms the wings are very delicate. The male moth about natural size is shown in Fig. 7. The moths of the Canker-worm would be on the wing at the same time but they are smaller.

### LIFE HISTORY.

The eggs hatch early in the spring and the young larvae feed upon the foliage of the apple tree, basswood, elm, hickory, etc., and are full grown about the middle of June, when they usually let themselves down by a silken thread, enter the ground about five or six inches, form a little oblong cell within which they change to the chrysalis state. In October or November (sometimes not until the following spring) when the moths appear. The wingless females climb the trees or other objects where they meet the winged males, pair and soon deposit the eggs in clusters, (usually upon the branches of the tree they have infested,) completing the life history.

### REMEDIES.

The life history of this species is so nearly like that of the Canker-worm that the remedies suggested for that insect are applicable to this. It has never done as much damage as the Canker-worm but it is capable of doing much injury to the foliage of apple trees and from the specimens received we should judge that it is quite abundant about Warren, Maine.

## The Apple-Leae Bucculatrix.

*Bucculatrix Pomifoliella Clemmens.*

Order Lepidoptera: Family Tineidæ.

We received from Mr. D. P Boynton, Monmouth, Me., a lot of apple tree leaves badly eaten by the larvæ of the above moth. In the box were quite a number of the larvæ and cocoons. This is the first time we have seen this species in Maine and as it is capable of doing considerable damage to the foliage of apple trees, we give the following account of it, so that it may be known and measures adopted to prevent it spreading.

### HISTORY.

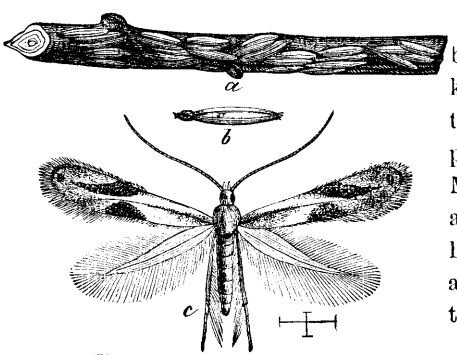



FIG. 8. The Apple-Leaf Bucculatrix. Bucculatrix pomifoliella, Clemmens. Moth enlarged, cocoons natural size and enlarged.

This moth was described by Clemens in 1860. It is known to be widely distributed having been reported from Texas, Missouri, Massachusetts, New York and now from Maine. It has done considerable damage to the foliage of apple trees especially in New York.

### DESCRIPTION.

*Eggs*—So far as we know the eggs of this species have never been described. They must be quite small as the cocoons of this diminutive moth have been mistaken for insect eggs. They are said to be laid upon the leaves. We have never seen them.

*Larva*—About one-half inch long when mature, cylindrical, tapering at both ends. Joints of the body rounded and prominent, color dark yellowish with a greenish tinge, and reddish shades on the anterior segments. Body armed with short black hairs which are more numerous on the back of the first segment. Head small, brown and elipsoidal. The larvæ are active and when disturbed suspend themselves by a silken thread.

*Cocoons*—Dirty white, slender, about one-fourth inch long, ribbed longitudinally by about six prominent ridges, oblong, tapering and thinning at both ends, flattened on the side to which it is attached. Usually fastened to the twigs and branches in groups as

shown in Fig. 8 a. Fig 8 b shows one of the cocoons enlarged. The specimens we had were confined in a box and the cocoons were attached to the leaves and side of the box. If it can be shown that in nature the cocoons are never attached to the leaves it would indicate a remarkable instinct, for if attached to the leaves which fall they would probably be destroyed, while attached to the twigs they would be safe during the winter. The cocoons contain the

*Chrysalis* which is dark brown, rough, punctured on the back, twelve hundredths of an inch long. When ready to transform the chrysalis works itself partly out of the cocoon and the moth comes forth

*Perfect insect* a small moth that is only about one-fourth inch expanse of wings. Fore wings whitish tinged with pale yellow and dusty brown. On the middle of the inner margin is a conspicuous oval brown spot. A wide streak of the same color on the opposite margin which extends nearly to the end of the wing where it tapers and points to a small circular brown spot near the tip. The moth much enlarged is shown in Fig 8 c. The hair lines to the right show the natural size.

## LIFE HISTORY.

This insect spends the winter in the chrysalis state in the cocoons usually attached to the twigs and branches of the host plant. There is reason to believe that the larvæ when full grown sometimes desert the host plant and form their cocoons on other plants close by. About the time the leaves unfold the moths come forth and lay their eggs upon the tender foliage. The larvæ are full grown in July. The specimens sent us in July were in the larval form and went into the chrysalis state in August and have not yet (January) emerged, which would indicate only one brood in Maine. Prof. Riley thinks there are two or three broods in the latitude of St. Louis, Mo. In the latitude of New York, Prof. Lentner states that there are two broods, one in July and one in September. Our specimens would belong to the July brood and possibly may be diseased and may not emerge. Possibly we have two broods in Maine. In September or October the cocoons are formed in which the pupæ spend the winter. The larvæ feed externally upon the foliage, at least the leaves we received had the upper epidermis and pulp eaten away in patches, the veins and lower epidermis intact.

REMEDIES.

*Natural*—This small moth is preyed upon by several parasites that attack the larvæ and hold the pest in check. Some of the cocoons probably suffer somewhat from inclemency of the weather. Possibly birds may eat them but we find no record of observations.

*Artificial*—(a) Jar the trees when the larvæ are full grown and they will suspend themselves by threads and can be swept down by a broom and killed by hot water or crushed.

(b) Apply kerosene emulsion with a spraying pump to the branches in winter that bear the cocoons. The same application might be made for the first brood when the foliage is on. Strong soap suds alone probably would kill them.

(c) If in small numbers the cocoons can be removed during the winter months by the hand.

## The Disippus Butterfly.

*Limenitis disippus*, *Godt.*

Order Lepidoptera.

We receive the larvæ of the above species occasionally on account of the fact, that the second brood of larvæ hybernate when about half grown and make a beautiful hybernaculum that is sure to attract attention, also the larvæ is highly ornamented with colors and tubercles, and quite noticeable. The eggs are beautifully reticulated, small and laid on the under side of the leaf near the end. Most people are surprised to learn that those grotesque larvæ and odd hybernacula pertain to one of our common butter-

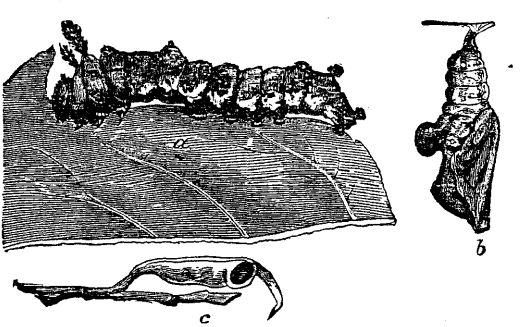



FIG. 9.

flies. Fig. 9 a shows the form of the full grown larvæ, b, the chrysalis, c, the hybernaculum in which the half grown larvæ of the fall

brood spends the winter. Fig. 10 shows the orange-red butterfly full size. The wings bear heavy black veins and a black border spotted with white.

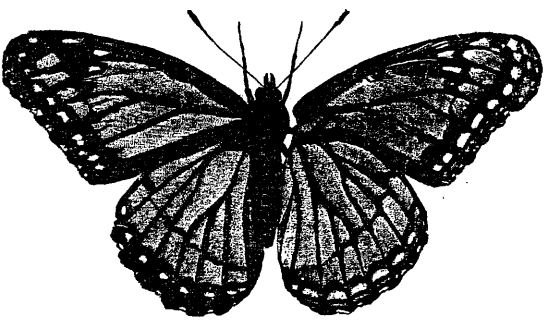


FIG. 10.

LIFE HISTORY.

The hybernating larvæ complete their growth go into the chrysalis state and the butterflies are on the wing by July. These deposit their eggs sometimes on the leaves of plums but usually upon willow or poplar. The eggs soon hatch and in a month the larvæ are full grown, enter the chrysalis state and in a short time the second brood of butterflies appear. These lay eggs which soon hatch and when the larvæ are less than half grown they make hybernacula from the leaves in which they spend the winter.

## THE MAY BEETLE.

*Lachnosterna fusca*, (Frohl.)

Order Coleoptera: Family Scarabæidæ.

We received the following letter last September in reference to the above insert:

"BRIDGTON, Maine, September 18, 1893.

*Professor Harvey*:

DEAR SIR—I send you specimens of a worm that is doing a great amount of damage to the farms in this vicinity. There are many acres of grass land in this town where a good crop of Timothy was cut the present season which now show hardly a green blade of grass. These worms are found just below the surface

where they feed upon the roots of Timothy. Can you tell us the name of the worm, its habits and if there is any way of extermination or curtailing its ravages? Will you please answer at once as we wish to find out how to treat the land this autumn.

"An early reply will greatly interest many farmers in this section of the State. Respectfully, J. L. WALES."

In response we sent Mr. Wales what information we had regarding the methods of coping with this pest. Mr. Wales published a newspaper article on this insect from which we make extracts to show the extent of the ravages of this insect in the State.

WHAT SHALL BE DONE WITH THE "WHITE GRUB."

This is becoming a very serious question with many farmers and gardeners at the present day in the town of Bridgton and vicinity.

A few days since Mr. A. M. Thomes, the owner of a nice farm on High street invited me to visit his grass fields. In one corner of a fine, large field which had borne a heavy crop of Timothy the present season, we found rather more than a half-acre upon which there was not visible a sign of vegetable life. What had composed the turf or sward could be stripped off and rolled up like a carpet, leaving the soil naked and brown and bringing to light upon each square foot of surface from a dozen to twenty flat white grubs. Several of these were put in alcohol and sent to Prof. F. L. Harvey of the State Agricultural College at Orono, who kindly and promptly sent what information he had at hand relative to the name, habits, and remedies, for this pest of the farmer. The grub especially loves to feed upon the roots of Timothy or herds grass, as may be seen upon the farms of Mr. Thomes, M. B. Stone, Nathan Palmer, Geo. Hilton and many others; it also loves the roots of the strawberry. Mr S. E. Lee of High street lost about one thousand fine strawberry plants the present season. The roots of corn are often devoured by the grub as may be seen on the farm of Mr. Geo. Chaplin, Naples Mr. John Palmer of South Bridgton lost a part of his potato crop in the same way.

Complaints from other parties and from other sections of the State show that the "White Grub" is wide spread and doing much damage in the State.

This insect is so familiar to everybody that we will take space to give an account of its life history but publish herewith a cut

so as to show clearly what insect is meant. Figure 11. 1 shows the pupa, 2 the grub, 3 and 4 side and dorsal views of the beetle. This insect is known as the "May Beetle," "June Bug" and "White Grub." In the larvæ state it feeds upon the roots of plants having done much damage to grass lands and especially to strawberry vines The beetle feeds upon the foliage of trees and where abundant often entirely stripping them of their leaves. The beetle is attracted by lights and is a frequent evening visitor to our living rooms while on the wing. The impression prevails that the eggs are laid on grass near the roots though perhaps this matter may bear further study.

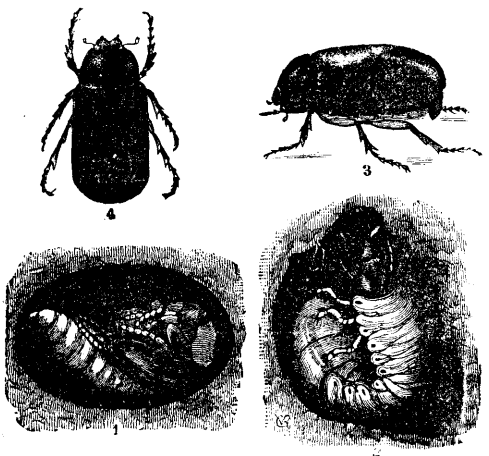



FIG. 11. The May Beetle. Lachnosterna fusca, (Frohl.) 1 pupa, 2 larvæ, 3 and 4 Beetle.

REMEDIES.

The Department of Agriculture at Washington, D. C., has conducted some experiments to show that kerosene emulsion liberally applied to the soil infested with "white grubs" will destroy them. The remedy would be too troublesome and expensive for application in large meadows but for small areas is worthy of trial. We extract the following from Prof. Riley's letter regarding the subject: "The application of kerosene emulsion for white grubs is impracticable over very large areas owing to the necessity of washing the emulsion into the soil to considerable depth by a copious application of water, unless the application can be made with tolerable certainty of its being followed by slow and continuous rains such as will carry it into the soil gradually without washing it away. These conditions will not often be available at the time wanted, but for all limited applications as to lawns or limited patches of ground affected by the larvæ, there is no better remedy than the kerosene emulsion treatment. I have no accurate data as to the amount required per acre but if the emulsion is applied sufficiently to thoroughly wet the surface of the soil to the depth of an inch or

more and then carried down by applications of water to a depth of about eight inches during the next two or three days, the treatment will certainly prove effective. The amount necessary will vary with the different soils, both of the emulsion and the water applied later on to carry it down, easily permeable, sandy soils requiring less than denser clay soils.

Professor J. B. Smith has found potash fertilizers in the form of *Kainit*, applied as a top dressing efficacious against root affecting insects, such as wire worms. We wrote Professor Smith regarding the matter and below is his reply.

NEW BRUNSWICK, N. J., September 22, 1893.

DEAR SIR—Your card of the 20th inst., is at hand. The latest on Lachnosterna you will find in Forbes' 17th Illustrated Report, issued in 1891. I have had no personal experience with these insects from the economic side, and cannot give you any positive or tried suggestions. You know my hobby, and if the matter came to me in New Jersey, I would advise heavy top dressings of Kainit and Nitrate of Soda applied in combination after the flight of the beetles is over in spring, or the former alone applied early in September. Yours very truly, JOHN B. SMITH.

Professor F. L. HARVEY, Orono, Maine.

Mr. Wales in his article suggests the following: "In the days of our fathers when the 'burnt pieces' were lighted up at night time by the partially extinguished fires, the farms and orchards were not infested by so many hostile enemies; and would not fires kindled in the neighborhood of orchards for a few evenings in late May or early June destroy the beetles and thus prevent the production of the white grub?"

The rooting propensities of swine can be put to practical account in destroying this pest. If I had meadow land on which the sod was dead and could be rolled up like a carpet, I would construct a movable fence and enclose the small areas and turn in a few hogs. The land would have to be reseeded and the swine could do no damage, and they would probably devour a large number of the grubs

Skunks and crows are known to be enemies of the "white grubs" but owing to the demand by furriers for the pelts of the former and our anti-crows law against the latter we have not much to hope for in those directions.

We hope the farmers whose fields are infested will try some of these measures. There is one consolation and that is the life history of this pest is completed in three years and it would not probably lay its eggs on the same ground again, but seek some new field of conquest.

## The Bean Weevil.

*Bruchus obtectus, Say.*

Order Coleoptera: Family Bruchidæ.

We received specimens of beans infested by the above insect from Hon. Samuel Libby, Orono. He gives the following interesting history regarding them: "The beans are of the horticultural variety and were gathered in the pods when ripe in September, 1891, and taken to my store where they lay until October, 1891. I then sorted out those that had six beans in a pod for seed and also those with five beans in a pod for second choice. The lot having five beans in a pod were put in an open basket in the store. They remained there during the summer of 1892 and about January 1, 1893 I had occasion to examine them and found they were infested. About one-tenth of the pods had holes in them and I found fine dust falling from the beans, and saw the holes in them. I also noticed small black objects in the basket. Not knowing that there was a bean weevil that worked on beans as the pea weevil does on peas I laid them aside for you.

The pods having six beans in them were shelled and planted in the spring of 1892 and showed no signs of weevil work. I have grown horticultural beans for twenty years and have always raised my own seed. In 1891, 4, planted beans obtained elsewhere and the beetle might have been introduced with that seed. "The crop of 1892 shows no evidence of weevil work."

We examined the specimens submitted and found them to be *Bruchus obtectus*, Say. The beans contained eggs; minute larvæ just hatched; larvæ one-third, one-half and full grown; pupæ in various stages of development; full grown pale colored beetles; some full colored ready to emerge; others free in the basket alive and some apparently dead. There were as many as twenty individuals in some of the beans. There were numerous holes in some of the beans from which the beetles had escaped, also many oval

translucent places where the coating of the bean had been made thin by the beetles indicating their location within. The inside of some of the beans was completely eaten and only the powdery excreta remaining. We wish to add our testimony to that of Popenœ, Schwartz and Lintner that successive generations of this insect occur in stored beans, and also that if the food supply does not become exhausted they may survive into the *second season*. They will eat cotyledons, radicle and plumule. Several specimens showed the cotyledons entirely detach from the radicle and it intact. We believe the radicle is rejected not because it is less desirable for food but on account of it being small and nearly isolated from the bean mass. We found one specimen with the cotyledons nearly intact and the radicle eaten, its place being occupied by a well fed larva. In some specimens *nothing* remained excepting the seed coats filled with powdery excreta.

It has not been clearly shown that the beetles will not fly or crawl to new lots of stored beans and infest them.

Or in other words it is not known whether beans may become infested after they are stored by the beetles laying their eggs upon them. The general belief is that the beetles confine their attacks to the lot of beans infested and that they spread during the summer through the agency of eggs laid on the growing pods.

Prof. Lintner has shown that the beetles will lay their eggs upon dry beans and that in the infested lot that the young larvæ will gnaw into them and perfect themselves.

The fact that a part of the lot of beans which Mr. Libby took to his store was not infested when shelled the next spring would lead one to suspect that the others may have been infested by beetles getting into them after they were stored. The holes in the pods may have been made for the entrance of beetles as well as for their exit. The holes being in the pods shows that the beetles as well as the larvæ have adequate gnawing powers. The only thing that would prevent infection this way would be the sluggish habits of the beetles. Those we had in a warm room in January were quite active. They did not fly but crawled rapidly. Prof. Lintner's observations show clearly that they may spread from the beans originally infested in a lot to the others stored with them. It is also important to know whether the beetles that mature at all seasons of the year may not fly to new lots of stored beans and infest them.

The fact that successive generations occur in stored beans; that sound beans in the same lot may become infested and that possibly new lots may also become infested, makes this weevil a more formidable pest than was formerly supposed.

Beans are largely grown and consumed in Maine and should this insect become common much damage might be done. Below we give its history, characters and remedies.

HISTORY.

This species is probably not native but was introduced as early as 1860, at least, possibly from *Asia*. It would seem that it has erroneously been considered the same as *B. obsoletus*, Say., bred from *Astragalus* seeds from Indiana as early as 1831. This view is strengthened by the fact that it was found in 1876 at Philadelphia in beans from various countries from both continents. At present it is cosmopolitan. It was first noticed in Rhode Island in 1860 by Dr. Fitch, who described it as *Bruchus Fabœ*. Within the next ten years it was carried to nearly all parts of the United States. In 1870 it was known from several of the New England States. So far as we know it has not previously been reported from Maine. Professor Fletcher has not found it in Canada. As the beetles are sluggish and disinclined to fly it is mainly distributed in infested beans. Those wishing a fuller consideration of this insect will find an interesting summary of the facts known regarding it in Professor Lintner's 7th Report of the Injurious and Other Insects of the State of New York, p. 255.

*Characters*—A small beetle that would be usually found infesting beans or associated with them. See Fig. 12. There are two

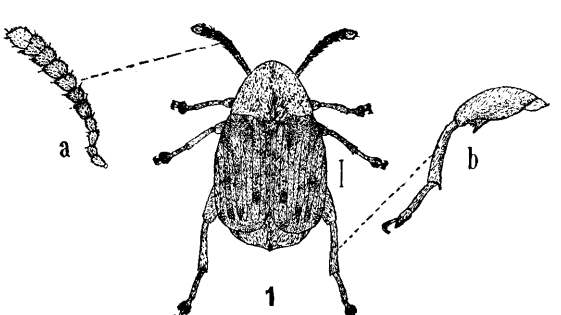



FIG. 12. Bean Weevil, much magnified.

closely related species of *Bruchus* that have been found infesting beans in this country. The above species is by far the most

common. It is one-tenth of an inch long, oval in form, head bent downward and more or less concealed from above, prolonged into a short, squarely-cut beak. Antennæ distinctly jointed, enlarged at the tip, the four basal and the terminal joints reddish or yellowish. Thorax and abdomen about the same width where they join. Wing covers marked by ten impressed and punctured lines in flattened ribs, which are clothed with a short pubescence, arranged in yellowish, black and whitish spots and lines—the white lines more distinct on the third rib. The abdomen is pale, dull yellow, with a black band on the fore part of each joint. It projects beyond the wing covers and that part is obscure grayish with a faint, medium whitish stripe. The hind thighs near their end armed with a long and two short spines. Feet reddish.

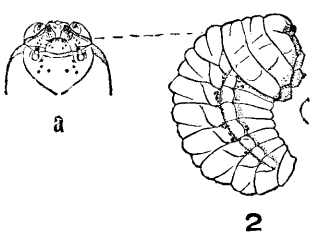



FIG. 13.

The larvæ are white and broadly oval, see Fig. 13. The eggs white, thicker at one end and about three times as long as wide.

The work of this insect appear on the surface of the beans as small holes from which the beetles have escaped, and small oval, translucent spots on the surface over the cells that contain bettles that have not emerged. The work is shown in Fig. 14. The inside of the bean in badly infested specimens is entirely converted into a powdery mass of excreta. Often the beans will contain larvæ in various stages of growth and also beetles. Fig. 15 shows the pupa. Fig. 16 shows the closely related Pea Weevil, enlarged and natural size, which is given for comparison.

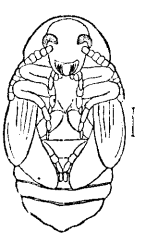



FIG. 15. Bean Weevil pupa.


FIG 14. Bean Weevil. Work of the insect.

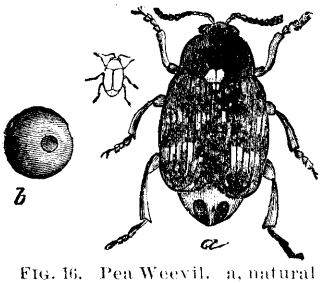



FIG. 16. Pea Weevil. a, natural size and enlarged; b, work of the insect.

LIFE HISTORY.

The eggs are laid upon the young bean pods after the flowers have withered, at any point, and sometimes many on a pod. The eggs hatch in a few days and the young larvæ enters the growing bean. It lives upon the substance of the bean making an excavation somewhat larger than itself in which it transforms to the pupa, finally to the beetle state. The beetles may emerge in the fall or at any time during the winter, lay eggs, which hatch and the larvæ enter the same beans or new ones. Successive generations may occur until the food supply is exhausted. Those beetles on the wing during the summer lay their eggs in the pods of the growing crop. The length of time required for the transformations has not been studied but probably is variable with circumstances. We found quite a number of dead beetles within the cells in the beans.

PRECAUTIONS

Experiments have shown that beans infested with *weevils* will not all sprout and that the plants from them are sickly and do not produce a full crop. It is therefore best not to plant them. It is believed upon good authority that beans containing the weevils in the beetle form are probably injurious and unfit food for man or beast.

REMEDIES.

If beans are found to be badly infested so as to be useless for food or seed, they should be *burned at once* so as to prevent the escape of the beetles.

Beans should be kept in a tight box or bag and any beetles that escape in the bag destroyed.

Throw the infested beans into hot water. (The exact amount of heat that beans will stand and germinate is not known but experiments would determine.) We feel sure the germ will stand more heat than the weevils.

Prof. Weed killed pea weevils by exposing the peas to a temperature of 145° F. for an hour. Bean weevils probably could be destroyed in the same way.

Probably the best way is to put the beans into a tight box and fill it with the vapor of *Bisulphide* of *Carbon* and leave it for two or three days. Bisulphide of Carbon is *very inflamable* and no light should be brought near it.

Experiments show that infested beans lack in vitality and when good seed can be had it is best to procure it and not run the risk of perpetuating the pest and growing a crop of weakened plants.

## The Pear-Blight Beetle, or Shot-Borer.

*Xyleborus pyri*, *Peck*=*X. dispar*, *Fbr.*

Order Coleoptera: Family Scolytidæ.

Last summer we received some small apple tree limbs from Professor Munson for examination. They were handed to him by Mr J. N. Allen, North Sedgwick, Me. We obtained the same insect from Dr. Twitchell about the same time from the vicinity of Augusta. These limbs were literally honey-combed with small channels that extended through the liburnum and heart wood to the centre. The exit holes through the bark were .06 to .08 of an inch in diameter and nearly circular, looking like small shot holes. The wood was green showing that the insect attacks the growing tree. Living wood does not appear to be essential to the life and comfort of this species, for after a period of several weeks we found in a limb that had been in a dry place in a box, young larvæ, full grown larvæ, pupæ and perfect beetles. We put a portion of a small limb (2 inches by 3 inches) in a box and allowed the pupæ to transform and in the fall we found fifty beetles had emerged.

We wrote a short account of this insect at the time for the *Maine Farmer* and called it *Xyleborus pyri*, Peck, the Pear-blight Beetle. To be absolutely certain we sent some specimens to Mr. A. H. Hopkins, Morgantown, West Virginia, who has given special attention to the *Scolytids* and he sent the following reply:

"The beetle you sent is *Xyleborus pyri*, Peck=*X. dispar*, Fbr. This species is quite common in West Virginia, but strange to say, I have never met with it in apple or pear trees. I find it in hemlock, beech, birch and oak. I have specimens of X. dispar from

Germany and though I can detect a slight difference between the females of the European and American form yet there is not difference enough to separate them as distinct species." We have seen this beetle in abundance in juniper about Orono and we have no doubt that it has transferred its depredations from adjacent forest to the orchards. Professor Fletcher reports its increase in Nova Scotia.

Below we give a description, the life history and suggestions for the treatment of this beetle.

### DESCRIPTION.

So far as we know the eggs have not been described. They must be very small and are said to be laid at the base of the buds. We have never seen them. The young larvæ bore into the wood making deep channels which in small twigs interfere with the circulation of the sap, and the twigs wither giving the appearance of blight, hence the name PEAR-BLIGHT BEETLE. The work of this beetle should not be confounded with the Pear-blight proper which is caused by a species of bactaria. When the larvæ are full grown they transform to pupæ in the burrows and finally emerge as small beetles about one-tenth of an inch long and of a dark brown or nearly black color, with the antennæ and legs of a rusty red. The thorax is short, very convex, rounded and roughened. The wing covers are marked by longitudinal rows of punctures. The hind part of the body slopes abruptly. The beetle natural size and enlarged are shown in Fig. 17. The beetles leave their burrows in July and deposit eggs before August.

FIG. 17. Pear-blight beetle. Natural size and enlarged.

### REMEDIES.

As these beetles work wholly under the bark they cannot be reached by insecticides. The only way is to watch the trees during the latter part of June and July and if blighted twigs or diseased limbs are noticed examine the branches for small pin holes and if found the presence of this or some related species may be suspected. The diseased limb should be cut *at once* below the injury far enough to include all the burrows, and *burned*, for the beetles will transform, emerge and attack new trees. As these beetles live in forest trees orchards near timber would be more likely to become infested.

## Carrot Fly—Carrot Rust Fly.

*Psila rosæ*, Fab.

Order Diptera:

We received the following letter from Mr. Morrell which was accompanied by the *larvæ* and pupæ of a species of fly, also pieces of carrot in which the maggots had been working.

"Pittsfield, Maine, April 6, 1893.

*Professor F. L. Harvey*:

Dear Sir—I send little worms which I would like to have you identify. The worms are in our carrots and have made holes all through them, after the manner of those in the piece I send. The carrots were placed in a barrel and the barrel filled up with fine dry sand like that I send. On sifting the sand I find it full of worms. Beets grown side by side with the carrots, and packed in the same kind of sand have no worms. Very truly,

C. H. Morrell"

Not recognizing the species we wrote Mr. Morrell that the specimens were the larval and pupal stages of a fly that we would have to transform and obtain the flies before identifying it. The infested material being only a barrel of sand and this very fine we suggested sifting it to remove the pupæ and larvæ that had left the carrots to transform and burning the siftings; or heat the whole material with hot water. We received the following reply accompanied with fully *two hundred* pupæ and larvæ.

"Pittsfield, Maine, April 11, 1893.

Dear Sir—Your card received. For the information, thanks. I have sifted part of the sand and burnt the siftings, and put the rest in boiling water. I don't believe those insects will do any more harm. I send another box of them as you requested.

Very truly,

C. H. Morrell."

After having reared the flies we wrote Mr. Morrell as follows:

"Orono, Maine, May 26, 1893.

*Mr. C. H. Morrell*:

Dear Sir—I have reared the flies from the pupæ and larvæ, which were affecting your carrots, and am now able to state that it is the "Rust Fly" or "Carrot Fly" an *imported* species from *England*, which has been giving some trouble since 1886 in Canada but

so far as I know has *never* before been reported from the United States. It is regarded as a very troublesome insect abroad and its introduction here is certainly unfortunate. I am at a loss to suggest how it reached your locality, and will be pleased if you can give me any help in the matter. Have you noticed it before in your place? Please ascertain whether your neighbors have noticed it. Have carrots been imported to your locality, if so, from where? You better watch your carrot bed this season and if the leaves of the young plants turn brown, examine the young roots for the brown rust spots on the surface and the interior for the maggots. If you find them, then after thinning, sift sand saturated with kerosene between the rows, and water heavily to pack the dirt close to the roots so the flies cannot crawl down to lay their eggs.

Respectfully, F. L. HARVEY."

We put the larvæ and pupæ sent by Mr. Morrell into sand in a breeding cage and in about two weeks the flies began to emerge in abundance and continued to come out for two weeks. We transferred some males and females to a jar containing parsnips, as we were not able to get carrots. In a day or two we noticed the females crawling between the leaves and going down to the base of them and though we had not observed them mating presumed they were ovipositing. The next day we broke off a leaf and found the eggs near the base laid on the surface in small clusters and loosely attached to the surface of the leaf. Having now eggs, larvæ, pupæ and flies we made out the following description:

*Eggs*—.6 mm. long (.024 in.) by .115 mm. broad (.0046 in.) white, oblong, about five times as long as broad, longitudinally marked from end to end by about 10 ridges and furrows which are from centre to centre .022 mm. The furrows between the ridges are marked by about thirty circular pits. The sculpture resembles the surface of a peanut. At one end the egg abruptly narrows and bears an oblong pedicil, twice as broad as long, and one-third the width of the egg at the widest part, (.022 mm. x .044 mm.) The pedicilate end of the egg reminds one of a tied grain sack. See Fig. 18.

FIG. 18. Egg of Psila rosæ × 50 times. (Original.)

*Larvæ*—6 mm. long, (.25 in.) breadth 1 mm., (.04 in.) legless, white or pale yellow, semi-transparent, head end quite pointed and armed with a pair of black hooks for gnawing. Aboral end

blunt, obliquely docked and bearing on the face of the oblique portion the dark colored caudal spiracles. Third segment from the last longest and somewhat longer than the last two. The sutures between the segment deep. The segments somewhat transversely wrinkled. See Fig. 19.

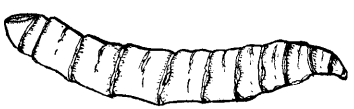


Fig. 19. Psila rosæ. Larva × 8 times (original.)

*Pupæ*—5 mm. (.20 in.) long, 1.25 mm. (.05 in.) wide, coarctate, brown, obliquely docked behind. The docked portion bordered by a rim and bearing two black tubercles. Fig. 20 shows dorsal and side views. The form of the pupæ is quite variable. Some have two tubercles at the head end and the black candol spiracles show on the oblique end. Some have the sides parallel while others are quite fusiform. The surface is quite wrinkled. Some are fully a fifth longer than others.

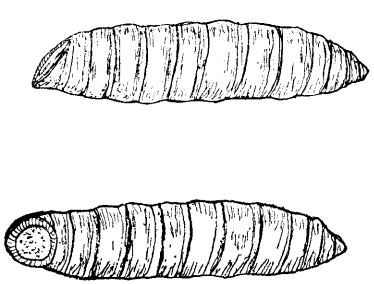


Fig. 20. Psila rosæ. Pupæ × 8 times (original.)

*Flies*—Length 6 mm. (.25 in.) Wings 3.5 mm. long (14 in.) and extending nearly half their length beyond the abdomen, thin and iridescent. Abdomen and thorax shining pitch black clothed with short grayish pubescence. Head pale orange or yellowish; eyes dark brown; Antennæ basal joint general color of head, terminal joint nearly black, bristles light. A spot above the mouth black, palpi black, proboscis very prominent, oblong and armed with many short hairs. Legs pale yellowish brown. Abdomen ovate. Scutellum raised and bearing two bristles. Arista armed with short hairs. About eight bristles on the mesothorax. The flies have the habit of opening and closing the wings, which are quite iridescent in the sunlight. The males are smaller than the females. Fig. 21 shows the form and veining of the wing. If the veining of the wings of *Psila rosæ* are correctly shown in the small cut in United States Agricultural Report, 1893, p. 133 then serious doubt arises regarding the determination for the veining of the wings of our specimens are quite different. Probably in so small a cut accuracy was not considered essential.

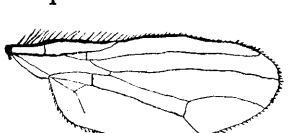


Fig. 21. Psila rosæ, wing × 10 (original.)

# APPENDIX.

Annual Report of the State Pomological Society.

1893-94.

FARMINGTON, June 1, 1894.

Hon. B. WALKER MCKEEN,

*Secretary Maine Board of Agriculture:—*

I have the honor to transmit herewith for publication in the annual report on the agriculture of Maine, the transactions of the Maine State Pomological Society for the year 1893–94.

Yours respectfully,

D. H. KNOWLTON, *Secretary.*

# MAINE STATE POMOLOGICAL SOCIETY.

## Transactions for the Year 1893.

### REPORT OF THE SECRETARY.

Of the general conditions of fruit culture in the State it is gratifying to note that among land owners there has been the past year an unusual interest in all that appertains to the science and art of raising fruit. There has been a wide-spread call for information on fruit matters, and uniformly when public meetings have been held they have been largely attended by people in search of knowledge. At the public meetings during the fair the "Varieties of Small Fruits Best Adapted to the State" was the general subject under consideration, and it awakened great interest. At the meeting of the executive committee held in Winthrop great interest was shown both in orcharding and small fruits. The State Board of Agriculture at the farmers' institutes, in answer to numerous calls, finds attentive and eager listeners when fruit matters receive consideration. Again the last legislature in answer to our request for an increased stipend, without the slightest objection unanimously doubled the appropriation. These are but a few of the indications of the wide-spread interest which people have in the industry.

The apple crop was a small one, probably not over fifty per cent of an average. Of the causes that brought this about we are in doubt. The blossom was not heavy, and the worms were never more abundant. Then in some parts of the State there were several hail storms, and the disaster of the August rain and wind storm was widespread. Fortunately there were many who had the wisdom to make the most of the misfortune, and following the example of one large orchardist, fed the windfalls to the cows.

The farmer's wife said, "as they couldn't sell the apples, they just put them where they could get more cream."

When the harvest came a large percentage of the apples were wormy or bruised, but at the same time it should not be overlooked that the farmers have received a good sum of money for their apples even this year. The apples helped out in many cases where the other crops were short. One Franklin county orchardist made a price of $6 per barrel for his No. 1's and $3 for his No. 2's, and the apples were sold. The grower said he might have had a little more if he had held a little longer. He was well satisfied, however, for he got his price.

## DOINGS OF THE SOCIETY.

The first work of the executive committee was to outline the work with reference to the increased appropriation. The premium list was extended about $100; a cooler for cut flowers was provided; an expert was called in for judging at the fair; and other new work was undertaken. Unfortunately through an oversight of some of the officials only the usual sum of $500 was actually appropriated for our Society for 1892 and 1893. This made the situation somewhat embarrassing for the committee, but it was decided to carry out the plan so far as it had been arranged for, and also to extend our work in other directions to some extent, and ask the next legislature to provide for the oversight of the last by making good the deficiency. This course seemed to be the wisest under the circumstances, and so far as we are able to learn meets with the approval of the public.

## PUBLIC MEETINGS.

The surroundings for the most successful public meeting during the fair are not favorable. This year the restaurant building was occupied for the meeting, and though more comfortable than the wing of the exhibition building, is far from being an ideal place for such a gathering. Then again the officers of the Agricultural Society appoint our meeting the same evening as their annual election. The meeting itself was satisfactory, although the rainstorm prevented the attendance of some who would have enjoyed the programme. So much inquiry had been made concerning the best varieties of small fruits for the State, it was decided to ask our

most prominent fruit growers to make public their own preferences after years of experience. Valuable information was gained, and the results may be found on subsequent pages of the Transactions. It will be found helpful to many people who are groping in darkness at the present time. It was an unexpected pleasure to welcome among us Secretary Sessions of the Massachusetts State Board of Agriculture. His greetings to our people were most cordial, showing that he was in sympathy with all engaged in the pursuit of agriculture. Excellent vocal music was furnished by Mr. A. R. Smiley.

The executive committee decided to make their fall meeting more than a matter of formal business as heretofore. By invitation of the fruit growers of Winthrop, public meetings were accordingly held in the Town Hall, Winthrop, October 26th. The afternoon session was devoted to the consideration of the general subject of orcharding, conducted by President Pope. The evening session was devoted to the culture of small fruits, Willis A. Luce being the principal speaker. Professor Munson, W. P. Atherton, the Secretary and others took part in the discussions. The fruit growers were invited to make an exhibition of their fruit, and a fine display of fruit was arranged in the hall. Several ladies brought in collections of flowers to adorn the tables, and they were made very attractive to visitors. Excellent music was furnished for the evening meeting under the direction of Charles E. Moore. The executive committee desire at this time to express their full appreciation of the cordial reception accorded to them and others by the good people of Winthrop.

For various reasons it was deemed advisable to hold the winter meeting in the month of December. In this meeting as in recent years we were joined by the State Board of Agriculture. The papers presented were not as many as in former years, but the character of the papers was excellent, and the opportunity for discussion was highly appreciated. By courtesy of Willis A. Luce, an invitation was received from the officers and members of the North Knox Agricultural Society to hold the meeting in Union. The Town Hall was in readiness for the gathering, and at every point the visitors were indebted to our members, Willis A. Luce and Alonzo Butler and others of the beautiful town of Union, for many courtesies and attentions. The town on the first afternoon and evening of our meeting was nearly obscured by the whirling snow-

flakes that danced around the tree-tops and spires and then rushed in furious gusts about the streets. But the next morning the sun rose over a scene of unrivalled beauty. Every twig and tree was sparkling with ice and the face of nature was white and pure as snow could make it. So these gems also sparkled on the trees and shrubs as we turned our backs upon the town, and bade good bye to the many friends we had met. But all the way home we were pleasantly reminded of the thoughtful courtesy that placed at the disposal of each departing guest a bag of choice fruit. The attendance at the meeting was large and enthusiastic, in spite of the bad weather part of the day and evening.

In connection with this meeting there was an exhibition of fruit from various parts of the State for which premiums were offered. The exhibition was a good one and the officers were much gratified at the results. The awards made appear in connection with others in this volume.

## ANNUAL EXHIBITION.

Other interests overshadow the fruit to such an extent that as yet we have been unable to induce the State Agricultural Society to hold their exhibition later than the first week in September. It is too early for a good exhibition of fruit, but in consequence of the large numbers of people in attendance at this fair it seems to be the most favorable time for our exhibition. Friendly feelings exist between the two societies, and our business relations have been honorable in every respect. It would be better if we could have a different exhibition room, but here, as in many other situations, it seems wise to make the most of what we have, and pull all the harder somewhere else.

Of the fruit on exhibition it fell far below our average, both in quality and quantity. With the dry weather, prevalence of insects, the frequency of hailstorms and heavy gales it was quite remarkable to see as many as were spread out upon the tables. No fruit this year was shown from Franklin, York, Hancock, Washington, Aroostook or Piscataquis counties.

The flower exhibit was large, but in quality not up to former years. Growers were enthusiastic, but declared that there were so many difficulties that they had little courage to make any exhibition. We were thankful, however, that they came and helped us make up our exhibition. The flowers form the most attractive

feature of our exhibitions, and we should be glad to have the florists of our State generally join hands with us and aid us in cultivating the love of flower culture.

The window garden department, in which the children of Lewiston and Auburn showed the plants they had grown, was one of the pleasing features of the exhibition. The plants showed more care than those brought in the year before. This is the second year in which the society has given plants and premiums to the children. The object is two-fold—to teach children in a pleasing way to love the plants and to care for them. Hundreds of the little folks came to look upon the plants, and among them were many older people. The enthusiasm of the children was contagious and the pleasures of the exhibition and the lessons they learned will not soon be forgotten. We are confident that this department is one of the most useful.

The wild flower exhibit was not as large as we could wish, and we regret that there were not a larger number of exhibitors, but at the same time there are many indications of greater interest in the study of botany, and it can not be that the teachers in the State are not in sympathy with our work in this direction. There was only one general class exhibit. This was from the Sanford High School, and the excellence of the specimens and the accuracy of the analeyss deserve special mention. The individual collections of pressed specimens were excellent. It will be a wise policy for our society to extend this work in the future.

The awards made appear in another place, to which reference is made.

Mr. Elijah A. Wood of Newton, Mass., acted as our judge on fruit and flowers. His work was generally acceptable to exhibitors. It is the belief of most of our members that a judge should always be employed by the Society, and there can be little doubt but good results will follow.

## OFFICERS FOR 1894.

*President.*

CHARLES S. POPE, Manchester.

*Vice Presidents.*

S. H. DAWES, Harrison.

D. P. TRUE, Leeds Center.

*Secretary.*

D. H. KNOWLTON, Farmington.

*Treasurer.*

CHARLES E. WHEELER, Chesterville.

*Executive Committee.*

The President and Secretary, *ex-officio*; A. E. Andrews, Gardiner; W. M. Munson, Orono; J. W. True, New Gloucester.

*Trustees.*

| | | |
|---|---|---|
| Androscoggin | County, | Charles L. Emerson, South Turner. |
| Aroostook | " | J. W. Dudley, Castle Hill. |
| Cumberland | " | S. R. Sweetser, Cumberland Center. |
| Franklin | " | M. C. Hobbs, West Farmington. |
| Hancock | " | F. H. Moses, Bucksport. |
| Kennebec | " | E. A. Lapham, Pittston. |
| Knox | " | Alonzo Butler, Union. |
| Lincoln | " | H. J. A. Simmons, Waldoboro'. |
| Oxford | " | C. H. George, Hebron. |
| Penobscot | " | C. A. Arnold, Arnold. |
| Piscataquis | " | A. W. Gilman, Foxcroft. |
| Sagadahoc | " | A. P. Ring, Richmond. |
| Somerset | " | James S. Hoxie, North Fairfield. |
| Waldo | " | D. B. Johnson, Freedom. |
| Washington | " | M. S. Springer, Danforth. |
| York | " | John C. Small, Cornish. |

*Member of Experiment Station Council.*

D. H. Knowlton, Farmington.

*Committee on Nomenclature.*

Z. A. Gilbert, North Greene; D. P. True, Leeds Centre; C. M. Weston, Belgrade.

*Committee on New Fruits.*

Willis A. Luce, South Union; T. M. Merrill, West Gloucester; J. W. True, New Gloucester.

# MEMBERS OF THE SOCIETY.

NOTE.—Any errors or changes of residence should be promptly reported to the Secretary. Members will also confer a favor by furnishing the Secretary with their full Christian names where initials only are given.

## LIFE MEMBERS.

Andrews, A. Emery.....Gardiner
Andrews, Charles E.....Auburn
Arnold, C. A.....Arnold
*Atherton, H. N.....Hallowell
Atherton, Wm. P.....Hallowell
Atkins, Charles G.....Bucksport
Atwood, Fred.....Winterport
Averill, David C.....Temple
Bailey, W. G.....Freeport
Bennoch, John E.....Orono
Boardman, Samuel L.....Augusta
Briggs, D. J.....South Turner
Briggs, John.....Turner
Burr, John.....Freeport
Butler, Alonzo.....Union
*Carter, Otis L.....Etna
Chase, Henry M., 14 Quincy St., Portland
Chase, Martin V. B.....Augusta
*Clark, Eliphalet.....Portland
Cole, Horatio G.....Boston, Mass
Crafts, Moses.....Auburn
*Crosby, William C.....Bangor
Dana, Woodbury S.....Portland
Dawes, S. H.....Harrison
DeRocher, Peter.....Bradentown, Fla
Dirwanger, Joseph A.....Portland
Dunham, W. W.....North Paris
Dyer, Milton.....Cape Elizabeth
*Emerson, Albert.....Bangor
Emerson, Charles L.....South Turner
Farnsworth, B. B.....Portland
Frost, Oscar F.....Monmouth
*Gardiner, Robert H.....Gardiner
Gardiner, Robert H.....Boston, Mass
George, C. H.....Hebron
Gilbert, Z. A.....North Greene
*Godfery, John E.....Bangor
Gurney, Lemuel.....Hebron
Hackett, E. C.....West Gloucester
Hanscom, John.....Saco
Harlow, S. C.....Bangor
*Harris, N. C.....Auburn
Harris, N. W.....Auburn
Harris, William M.....Auburn
Harvey, F. L.....Orono
*Hersey, T. C.....Portland
Hobbs, M. Curtis.....West Farmington
Hoffses, Elmas.....Warren
Hoxie, James S.....North Fairfield
Hoyt, Mrs. Francis.....Winthrop
Ingalls, Henry.....Wiscasset
Jackson, F. A.....Winthrop
*Jewett, George.....Portland
Johnson, Isaac A.....Auburn
Jordan, Francis C.....Brunswick
Kenniston, E. H.....Arnold
Knowlton, D. H.....Farmington
Lapham, E. A.....Pittston
Lombard, Thurston M.....Auburn
*Low, Elijah.....Bangor
*Low, S. S.....Bangor
Luce, Willis A.....South Union
McLaughlin, Henry.....Bangor
Merrill, T. M.....West Gloucester
*Metcalf, M. J.....Monmouth
Moody, Charles H.....Turner
Moore, William G.....Monmouth
Moor, F. A.....Waterville
Morton, J. A.....Bethel
Morton, William E.....Portland
*Noyes, Albert.....Bangor
Perley, Chas. I...Seward's (Vassalboro')
Pope, Charles S.....Manchester
Pulsifer, D. W.....Poland
Purington, E F.....West Farmington
*Richards, F. G.....Gardiner

*Deceased.

## LIFE MEMBERS—Concluded.

Richards, John T. ..... .....Gardiner
*Richardson, J. M. .....Gardiner
Ricker, A. S. .....Turner
Roak, George M. .....Auburn
Robinson, Henry A. ..... ..... Foxcroft
Rolfe, Samuel ..... .. Portland
Sawyer, Andrew S. ... . Cape Elizabeth
Sawyer, George B. ..... .... ..Wiscasset
*Shaw, Stillman W.. .....West Auburn
Simmons, H. J. A. .....Waldoboro'
Skillings, C. W. .....North Auburn
*Smith, Alfred. .....Monmouth
Smith, Henry S. .....Monmouth
Starrett, L. F. ..... .....Warren
Stetson, Henry ..... .....Auburn
*Stetson, Isaiah ..... ..... Bangor
Stilphen, Asbury C. .....Gardiner
Stanley, Charles ..... .....Winthrop
Stanley, O. E. ..... ... .....Winthrop
Staples, G. K. .....Temple
Strout, S. F. .....West Falmouth
Strattard, Mrs. A. B... ..... .....Monroe
Sweetser, S. R. .....Cumberland Center
*Taylor, Joseph ..... .....Belgrade
Taylor, Miss L. L., (Lakeside) Belgrade
Thomas, William W., Jr. .....Portland
Thomas, D. J. ..... North Auburn
Tilton, William S. .....Boston, Mass
True, Davis P. .....Leeds Center
True, John W. .....New Gloucester
Varney, James A. ....The Dalles, Oregon
Vickery, James. .....Portland
Vickery, John. .....Auburn
Wade, Patrick ..... .....Portland
Walker, Charles S. .....Peru
Waterman, Willard H. .....East Auburn
*Weston, James C. ..... ..... Bangor
Wharff, Charles S. .....Gardiner
Wheeler, Charles E. .....Chesterville
Whitney, Edward K ..... .....Harrison
Woodard, Mrs. S. M.. ..... ..... Gardiner
Woodman, George W. ..... ..... Portland

## ANNUAL MEMBERS, 1893.

Abbott, Mrs. L. F. .....Lewiston
Allen, W. H. ..... ..... Augusta
Bartlett, B. W ..... ..... East Dixmont
Bennett, Charlie A. ..... ....Sanford
Chandler, Mrs. B. W ..... .....Freeport
Cummings, Mrs. Anthony.... ..Auburn
Dudley, J. W ..... .....Castle Hill
Eastman, A. A. .... ..... Dexter
Grant, Mrs. Benson..... ...Lewiston
Grover, Mrs. F. D .....Bean's Corner
King, A. R. .....North Monmouth
Larrabee, O. L. .....West Levant
Lemont, J. M .....West Bath
Mansur, A. M. .....Jackson
Merrow, J. H ..... .....South Smithfield
Munson, W. M. ..... ... .....Orono
Nelson, O. C. .....Upper Gloucester
Nowell, F. E. .....Fairfield
Ricker, W. B .... .....East Auburn
Ring, A. P.. ..... ...Richmond Corner
Snow, G. W.... ..... .....Newburg
Stevens, Ernest... .....Freeport
Stoddard, Edith M ... ..... .....Belfast
Townsend, Mrs. B. T..... .....Freeport
Waterman, Mrs. C. E. .....East Auburn
Wheeler, J. B. ..... ...Corinth
Woodside, E. G ..... .....Lewiston

## ANNUAL MEMBERS, 1894.

Cobb, J. O. ..... .....Union
Judkins, Charles H. .....Chesterville
Munson, W. M .....Orono
Robbins, R. B. .....Union
Tolman, I. B ..... .. .....Union
Willard, S. D. ..... ...Geneva, N. Y

# TREASURER'S REPORT.

## Statement of the Financial Condition of the Maine State Pomological Society, Ending December 1, 1893.

### RECEIPTS.

| | |
|---|---|
| State bounty | $538 88 |
| Loans | 450 00 |
| State Agricultural Society | 500 00 |
| Interest on permanent fund | 32 00 |
| Life membership | 50 00 |
| Annual membership | 26 00 |
| | $1,596 88 |

### EXPENDITURES.

| | |
|---|---|
| A. S. Ricker, Treasurer, for 1892, balance due him | $30 31 |
| Salary and expenses | 10 40 |
| Loans | 500 00 |
| Expense of Executive Committee and Treasurer | 217 39 |
| Plants for Children's Department, State Fair | 21 44 |
| Cooler for cut flowers at State Fair | 55 00 |
| Judge at State Fair | 30 00 |
| Care of hall and trucking | 20 60 |
| Printing, etc. | 58 12 |
| Interest and discount on loans | 18 12 |
| Premiums at State Fair | 542 85 |
| Cash on hand | 92 65 |
| | $1,596 88 |

## FINANCIAL CONDITION AT DATE.

### ASSETS.

| | |
|---|---|
| Bounty due from the State | $500 00 |
| Property owned by Society | 200 00 |
| Permanent fund | 719 73 |
| Cash on hand | 92 65 |
| | $1,512 38 |

### LIABILITIES.

| | |
|---|---|
| Due on loan, First National Bank of Farmington | $300 00 |
| Outstanding orders | 259 03 |
| | $559 03 |

## PERMANENT FUND.

CREDIT.

| | |
|---|---|
| By fees of 109 life members to December 31, 1892 | $1,090 00 |
| fees of life members in 1893 | 50 00 |
| | $1,140 00 |

DEBIT.

| | |
|---|---|
| To deposit in Wiscasset Savings Bank | $ 19 73 |
| four shares First National Bank of Farmington | 400 00 |
| two shares Merchant's National Bank, Gardiner | 200 00 |
| one share Farmington Water Company | 100 00 |
| balance due permanent fund | 420 27 |
| | $1,140 00 |

CHARLES E. WHEELER, Treasurer.

UNION, December 6, 1893.

# List of Premiums Awarded at the Annual Exhibition.

For best general exhibition of apples: C. A. Arnold, Arnold, first, $15; C. I. Perley, Cross Hill, second, $10; S. H. Dawes, Harrison, third, $6.

For best exhibition of apples not named in premium list: Alonzo Butler, Union, first, $5; F. E. Nowell, Fairfield, second, $3.

For best exhibition of apples grown in Androscoggin county: D. P. True, Leeds Center, first, $8; D. J. Briggs, South Turner, second, $6.

For same in Cumberland county: J. W. True, New Gloucester, first, $8; S. H. Dawes, second, $6; S. R. Sweetser, Cumberland Center, third, $3.

For same in Kennebec county: E. A. Lapham, Pittston, first, $8; C. I. Perley, second, $6.

For same in Knox county: Alonzo Butler, first, $8; Willis A. Luce, South Union, second, $6.

For same in Oxford county: C. H. George, Hebron, first, $8; Lemuel Gurney, Hebron, second $6;

For same in Penobscot county: O. L. Larrabee, West Levant, first, $8; G. W. Snow, Newburg, second, $6; H. W. Brown, Newburg, third, $3.

For same in Sagadahoc county: J. M. Lemont, West Bath, first, $8; A. P. Ring, Richmond Corner, second, $6.

For same in Somerset county: J. S. Hoxie, North Fairfield, first, $8; F. E. Nowell, second, $6; J. H. Merrow, South Smithfield, third, $3.

For same in Waldo county: B. W. Bartlett, (Monroe) East Dixmont, first, $8; A. M. Mansur, (Jackson) East Dixmont, second, $6.

SINGLE PLATES.

Baldwins: J. Pope, Manchester, first, $5; C. I. Perley, second, $3; S. H. Dawes, third, $2.

Gravenstein: J. Pope, first, $3; C. A. Arnold, second, $2.

Northern Spy: C. I. Perley, first, $3; S. H. Dawes, second, $2; Willis A. Luce, third, $1.

Rhode Island Greenings: J. H. Merrow, first, $5; C. I. Perley, second, $3; C. A. Arnold, third, $2.

Roxbury Russets: Lemuel Gurney, first, $3; C. H. George, second, $2; Alonzo Butler, third, $1.

Tompkins King: S. H. Dawes, first, $3; G. W. Snow, second, $2; C. I. Perley, third, $1.

Yellow Bellflower: C. A. Arnold, first, $3; G. W. Snow, second, $2; A. P. Ring, third, $1.

Alexander: C. H. George, first, $1; C. A. Arnold, second, 50c.

American Golden Russet: T. M. Lombard, Auburn, first, $1; E. A. Lapham, second, 50c.

Ben Davis: S. R. Sweetser, first, $1; J. W. True, second, 50c.

Deane: J. Pope, second, 50c.

Duchess of Oldenburg: S. H. Dawes, first, $1; J. S. Hoxie, second, 50c.

Early Harvest: Willis A. Luce, first, $1.

Fallawater: C. A. Arnold, first, $1; C. I. Perley, second, 50c.

Fall Harvey: C. H. George, first, $1; C. I. Perley, second, 50c.

Fameuse: S. R. Sweetser, first, $1; F. E. Nowell, second, 50c.

Garden Royal: E. G. Woodside, Lewiston, first, $1; S. H. Dawes, second, 50c.

Granite Beauty: C. I. Perley, first, $1.

Hubbardston Nonsuch: E. A. Lapham, first, $1; T. M. Lombard, second, 50c.

Jewett's Fine Red: C. I. Perley, first, $1; S. R. Sweetser, second, 50c.

King Sweeting; F. E. Nowell, first, $1; C. I. Perley, second, 50c.

Large Yellow Bough: E A. Lapham, first, $1; S. H. Dawes, second, 50c.

McIntosh Red: C. H. George, first, $1; S. R. Sweetser, second, 50c.

Milding: C. I. Perley, first, $1.

Mother: S. R. Sweetser, first, $1.

Munson Sweet: S. H. Dawes, first, $1.

Peck's Pleasant: J. S. Hoxie, first, $1; C. H. George, second, 50c.

Pomme Royale: C. H. George, first, $1; J. Pope, second, 50c.

Porter: Willis A. Luce, first, $1; E. A. Lapham, second, 50c.

Pound Sweet: S. H. Dawes, first, $1; C. I. Perley, second, 50c.

President: F. E. Nowell, first, $1.

Primate: C. I. Perley, first, $1; J. S. Hoxie, second, 50c.

Red Astrachan: J. S. Hoxie, first, $1; J. H. Merrow, second, 50c.

Rolfe: S. R. Sweetser, first, $1.

Somerset: F. E. Nowell, first, $1; S. R. Sweetser, second, 50c.

Stark: J. S. Hoxie, first, $1; J. W. True, second, 50c.

Starkey: J. Pope, first, $1; C. I. Perley, second, 50c.

Talman's Sweet: F. E Nowell, first, $1; Alonzo Butler, second, 50c.

Tetofsky: J. S. Hoxie, first, $1.

Wagener: S. H. Dawes, first, $1; T. M. Lombard, second, 50c.

Wealthy: J. W. True, first, $1; S. R. Sweetser, second, 50c.

William's Favorite: J. S. Hoxie, first, $1; J. H. Merrow, second, 50c.

Winthrop Greening: A. R. King, North Monmouth, first, $1; E. A. Lapham, second, 50c.

## Class 2—PEARS.

For best general exhibition of pears: S. H Dawes, first, $10; D. P. True, second, $8; C. I. Perley, third, $5.

Clapp's Favorite: W. B. Ricker, East Auburn, first, $3; Lemuel Gurney, second, $2.

Bartlett: S. H. Dawes, first, $3; C. I. Perley, second, $2.

Belle Lucrative: C. I. Perley, second, 50c.

Beurre d' Anjou: T. M. Lombard, first, $1; C. H. George, second, 50c.

Beurre Superfin: D. P. True, first, $1.

Beurre Diel: D J. Briggs, first, $1.

Buffum: D. P. True, first, $1; C. I. Perley, second, 50c.

Doyenne Boussock: S. H. Dawes, first, $1; C. I. Perley, second, 50c.

Duchesse d' Angouleme: Alonzo Butler, first, $1; S. H. Dawes, second, 50c

Goodale: C. I. Perley, first, $1; S. H. Dawes, second, 50c.

Howell: J. S. Hoxie, first, $1; S. H. Dawes, second, 50c.

Lawrence: Lemuel Gurney, first, $1; S. H. Dawes, second, 50c.

Louise Bonne de Jersey: D. P. True, first, $1; S. H. Dawes, second, 50c.

Seckel: D. P. True, first, $1; C. I. Perley, second, 50c.

Sheldon: S. H. Dawes, first, $1; C. I Perley, second, 50c.

Souvenir du Congress: D. P. True, first, $1.

## Class 3—GRAPES.

Collection open air grapes: S. H. Dawes, first, $5.

## Class 4—PLUMS.

For best general exhibition plums: Willis A. Luce, first, $6; S. H. Dawes, second, $4.

Bavay's Green Gage: Willis A. Luce, first, $1.

Bradshaw: Willis A. Luce, first, $1; Lemuel Gurney, second, 50c.

Green Gage: Lemuel Gurney, first, $1; F. E. Nowell, second, 50c.

Prince's Imperial Gage: T. M. Lombard, first, $1.

Red Gage: F. E. Nowell, first, $1; D. P. True, second, 50c.

Jefferson: J. W. True, first, $1.

Lawrence: F. E. Nowell, first, $1; T. M. Lombard, second, 50c.

Lombard: D. P. True, first, $1; Willis A. Luce, second, 50c.

McLaughlin: A. A. Eastman, Dexter, first, $1; Willis A. Luce, second, 50c.

Moore's Arctic: Willis A. Luce, first, $1.

Quackenbos: W. A. Luce, first, $1.

Smith's Orleans: T. M. Lombard, first, $1.

Yellow Egg: J. W. True, first, $1; Lemuel Gurney, second, 50c.

## Class 5—FRUITS IN GLASS.

For specimens of fruits in preserving fluid:

McLaughlin Plums: A. A. Eastman, first, 50c.

Shaffers Raspberries: A. A. Eastman, first, 50c.

Industry Gooseberries: A. A. Eastman, first, 50c.

## Class 6—Miscellaneous Articles, Canned Fruit, Preserves, Etc.

For best variety canned fruits, preserves, etc.: Mrs. Annie S. Corbett, Farmington, first, $8; Mrs. Benson Grant, Lewiston, second, $5.

Canned Blackberries: Mrs. D. P. True, Leeds Center, first, 50; Mrs. Benson Grant, second, 25c.

Canned Blueberries: Mrs Benson Grant, first, 50c.

Canned Cherries: Mrs. D. P. True, first, 50c.

Canned Peaches: Mrs. Annie S. Corbett, first, 50c.

Canned Pears: Mrs. Annie S. Corbett, first, 50c.

Canned Plums: Mrs. Benson Grant, first. 50c.

Canned Quinces: Mrs. Annie S. Corbett, first, 50c.

Canned Raspberries: Mrs Annie S. Corbett, first, 50c.; Mrs. Benson Grant, second, 25c.

Canned Strawberries: Mrs. D. P. True, first, 50c.; Mrs. Benson Grant, second, 25c.

Canned Tomatoes: Mrs Benson Grant, first, 50c.

Preserved Apples: Miss E. B Butler, Union, first, 50c.

Preserved Currants: Mrs. Annie S. Corbett, first, 50c.; Miss E. B. Butler, second, 25c.

Preserved Cherries: Mrs. Annie S. Corbett, first, 50c.; Miss E. B. Butler, second, 25c

Preserved Pears: Miss E. B. Butler, first, 50c.

Preserved Quinces: Mrs. Annie S. Corbett, first, 50c

Preserved Raspberries: Miss E. B. Butler, first. 50c.

Preserved Strawberries: Miss E. B. Butler, first, 50c.; Mrs. D. P. True, second, 25c.

Assorted Pickles: Mrs. Benson Grant, first, 50c.; Mabel E. Grover, Bean's Corner, second, 25c.

Tomato Catsup: Mrs. Benson Grant, first, 50c.

For Best Collection Apple Jellies: Mrs. Benson Grant, first, $2; Mrs. F. D. Grover, Bean's Corner, second, $1.

Apple Jelly: Mrs. S. R. Sweetser, (Red Astrachan) first, $1; Mrs. Benson Grant, second, 50c.

Crab Apple Jelly: Mrs. Benson Grant, first, 50c.; Mrs. L. F. Abbott, Lewiston, second, 25c.

Currant Jelly: Mrs. Annie S. Corbett, first, 50c.; Mrs. Benson Grant, second, 25c.

Quince Jelly: Mrs. Benson Grant, first, 50c.

Raspberry Jelly: Mrs. Benson Grant, first, 50c.; Mrs. L. F. Abbott, second, 25c

Rhubarb Jelly: Mrs. L. F. Abbott, first, 50c.

Strawberry Jelly: Mrs. L. F. Abbott, first, 50c.

Maple Syrup: C. H. George, first, 50c; Lemuel Gurney, second, 25c.

Maple Sugar: Lemuel Gurney, gratuity, 50c.

Gooseberry Jelly: Mrs. L. F. Abbott, gratuity, 50c.

## Class 7—FLOWERS.

For best display Cut Flowers: Charles S. Walker, Peru, first, $10; Mrs. B. T. Townsend, Freeport, second, $8; Mrs. Charles Stanley, Winthrop, third, $5.

Exhibition cut flowers grown by girl or boy under 15: Ernest Stevens, Freeport, first, $4; Arthur H Corbett, Farmington, second, $2.

Roses: John Burr, Freeport, first, $5.

Dahlias: Mrs. Chas. Stanley, first, $2.

Carnations: Mrs. B. W. Chandler, Freeport, first, $2.

Asters: Mrs. B. W. Chandler, first, $1; Mrs. Chas. Stanley, second, 50c.

Zinnias: Mrs. Francis Hoyt, Winthrop, first, $1; Mrs. Chas. Stanley, second, 50c.

Phlox Drummondii: Mrs. Chas. Stanley, first, $1; Mrs. B. T. Townsend, second, 50c.

Stocks: Mrs. B W. Chandler, first, $1; Mrs. Francis Hoyt, second, 50c.

Balsams: Mrs. Francis Hoyt, first, $1.

Petunias: Mrs. Chas. Stanley, first, $1; Mrs. B. T. Townsend, second, 50c.

Verbenas: Mrs. Chas. Stanley, first, $1; Mrs. Francis Hoyt, second, 50c.

Vase of Cut Flowers: Mrs. Charles Stanley, first, $3; Mrs. Francis Hoyt, second, $2; Mrs. Annie S. Corbett, third, $1.

Floral Design (amateur): Mrs. Lizzie M. Walker, Peru, first, $5; Mrs. Chas. Stanley, second, $3.

Floral Wreath: Mrs. Chas. Stanley, first, $2.

Dish of Cut Flowers: Mrs. Annie S. Corbett, first, $2; Mrs. Anthony Cummings, Auburn, second, $1.

Basket of Cut Flowers: Mrs. Annie S. Corbett, first, $2; Edward C. Pope, Manchester, second, $1.

Greenhouse Plants: W. G. Bailey, Freeport, first, $15.

Pot Plants: Mrs. B. W. Chandler, first, $10; Mrs. Anthony Cummings, second, $8.

Exhibition of Ferns: W. G. Bailey, first, $3.

Exhibition of Geraniums: Mrs. Anthony Cummings, first, $2.

Exhibition of Begonias: W. G. Bailey, first, $2.

Dracæna: W. G. Bailey, first, 50c.

Double Geranium: Mrs. Anthony Cummings, second, 25c.

Single Geranium: Mrs. Anthony Cummings, second, 25c.

Foliage Begonia: W. G. Bailey, first, 50c.

Flowering Begonia: W. G. Bailey, first, 50c.; Mrs. B. W. Chandler, second, 25c.

Carnation: Mrs. Anthony Cummings, first, 50c.

Ever-Blooming Rose: Mrs. Anthony Cummings, first, $1.

Single Pot Plant: Mrs. Anthony Cummings, first, $2.

Climbing Plant, on trellis: Mrs. Anthony Cummings, first, $2.

Cut Wild Flowers: Mrs. C. E. Waterman, East Auburn, first, $3.

Pressed Wild Flowers: Edith M. Stoddard, Belfast, first, $3; F. L. Varney, East Lowell, second, $2; Charlie A. Bennett, Sanford, third, $1

Collection Pressed Wild Flowers made by High School: Sanford High School, O. Howard Perkins, Principal, first, Household Microscope.

## WINDOW GARDEN DEPARTMENT.

Coleus. First premiums: Ernest Tainter, Hattie Emerson, Ethel Payson, Ethna Parker, Letitia Frost, Auburn; Frank Crowley, Annie Rawstron, Nancy Rawstron, Madge Lane, Elma Soule, Lewiston, 30 cents each.

Second Premiums: Allie Bearce, Bertie Ward, Carrol Wilcox, Lena Bailey, John Thomas, Auburn; Flossie Smith, Nellie Farnham, Laura M. Webster, Lewiston, 20 cents each.

Heliotrope. First Premiums: Laura Cobb, Thomas Chase, Auburn; Emma Reichel, Beulah Towle, Lewiston, 30 cents each.

Second premiums; Theo. Lothrop, Arthur Hayes, Lewiston, 20 cents each.

Geraniums. First premiums: Fannie Harlow, Anne Pratt, Ethel Burleigh, Charlie Lowell, Margie Murphy, Lizzie Briggs,

Belle Jordan, Harry Prince, Maud Stearns, Lila Yeaton, Earle Towle, Edith Warren. Amy Cushman, Auburn; Charles Saunders, Eugene Harville, Harry Hackett, Angie Keene, Eva Williams, Chandler Barron, Guy Dow, Sarah Stuart, George Sykes, Lillian Soule, Fred Rowe, John Joyce, Sadie Scott, Lewiston, 30 cents each.

Second premiums: Robin Barlow, Mary Stetson, Flossie Sanborn, Angie Welch, Sadie Johnson, Auburn; Winnifred Thompson, Grace Mills, Bertha Rideout, Lewiston, 20 cents each.

Composition about care of plant received: Lillian M. Soule, Lewiston, St. Nicholas Magazine, 1 year, $2.75; Mable Pulsifer, second; Florence Pulsifer, Auburn, third.

## List of Premiums Awarded at the Winter Meeting, Held in Union, December 5th and 6th, 1893.

General exhibition apples: G. K. Staples, Temple, $5; Charles S. Pope, Manchester, $4; Alonzo Butler, Union, $3.

Best Plate American Golden Russets: Charles H. Judkins, Chesterville, $1; J. O. Cobb, Union, 50c.

Baldwins: Charles S. Pope, $1; G. K. Staples, 50c.

Ben Davis: E. A. Lapham, Pittston, $1; Alonzo Butler, 50c.

Fallawater: William Hiscock, Farmington, 50c.; Charles S. Pope, 25c.

Fameuse: E. A. Mero, Union, 50c, J O. Cobb, 25c.

Hubbardston Nonsuch: C. H. Judkins, $1; R. B. Robbins, Union, 50c.

Jewett's Fine Red: Mial Mosman, Union, 50c.; E. Ware, Union, 25c.

Milding: Conrad A. Seiders, Union, $1; D. P. True, Leeds Center, 50c.

Mother: Charles S. Pope, $1.

Northern Spy: C. H. Judkins, $1; J. O. Cobb, 50c.

Rhode Island Greening: C. A. Arnold, Arnold, $1; E. A. Lapham, 50c.

Roxbury Russets: Alonzo Butler, $1; G. K. Staples, 50c.

Stark: J. O. Cobb, 50c.

Talman's Sweet: Charles S. Pope, $1; D. P. True, 50c.

Tompkin's King: R. B. Robbins, $1; Charles S. Pope, 50c.

Wagener: G. K. Staples, 50c.; J. O. Cobb, 25c.

Winthrop Greening: E. A. Lapham, 50c.
Yellow Bellflower: E. A. Lapham, $1; G. K. Staples, 50c.
Lawrence Pear: Alonzo Butler, $1.
Keifer: D. P. True, $1.
Vicar of Wakefield: D. P. True, $1.
White Doyenne: D. P. True, $1.
Quince: D. P. True, gratuity, $1.
Canned Apples: Hall & Wheeler, Chesterville, $2; Bonney, Wheeler, Dingley & Company, Farmington, $1.
Tumbler Apple Jelly: Hall & Wheeler, $1.

SUMMARY OF AWARDS AT THE ANNUAL EXHIBITION.

| | | |
|---|---|---|
| Apples—General collection | $ 39 00 | |
| County collection | 135 00 | |
| Specials | 49 00 | |
| Single plates | 49 00 | |
| | | $272 00 |
| Pears | | 51 50 |
| Grapes | | 5 00 |
| Plums | | 26 50 |
| Fruits in glass | | 1 50 |
| Miscellaneous—Collection canned fruits | $13 00 | |
| Canned fruits | 11 25 | |
| Jellies, &c | 10 00 | |
| | | 34 25 |
| Flowers, etc.—Cut Flowers | $51 00 | |
| Designs, &c | 22 00 | |
| Plants, &c | 47 75 | |
| | | 120 75 |
| Window Garden | | 18 35 |
| Wild Flowers | | 13 00 |
| Total | | $542 85 |

AT THE WINTER MEETING.

| | |
|---|---|
| On apples and other fruit | $42 00 |
| Awarded at Fair | $542 85 |
| Awarded at Winter Meeting | 42 00 |
| Total awards | $584 85 |

The awards made at the Winter Meeting do not appear in the Treasurer's report for 1893, except as a liability. These premiums were not paid until the report was closed. They will appear among the payments next year.

# Business Transactions at the Annual Meeting.

September 7, 1893. The members of the Society met at Park Hall, Lewiston, at 6.30, P. M. Proceeded to elect officers for 1894. [See page 8.]

On motion of Prof. Munson it was voted, that the Committee on Nomenclature be instructed to prepare a revised list of fruit to be presented at the next winter meeting.

AT THE WINTER MEETING, DECEMBER 5TH AND 6TH, 1893.

By arrangement with Hon. B. Walker McKeen, Secretary of the State Board of Agriculture, the Union Winter Meeting of the two organizations was held in Town Hall, Union, December 5th and 6th, 1893.

The meeting was called to order at the appointed hour, Tuesday, December 5th. The reports of the treasurer and secretary were read and accepted. [See preceding pages.]

*Voted*, That a committee on fruits and one on resolutions be appointed by the chair.

President Pope then appointed H. W. Brown and Charles A. Miller committee on fruits; and Charles E. Wheeler, D. P. True and H. G. Staples, committee on resolutions.

On motion of D. P. True, the recommendations of the President's address were referred to the following committee, designated by the chair: F. S. Adams, W. A. Luce, D. P. True.

Mr. H. W. Brown in behalf of the committee reported on the fruits on exhibition and their report was accepted. See pages 20, 21 for awards.

Mr. F. S. Adams in behalf of the committee to whom were referred the recommendations of the President's address, reported as follows:

The President called attention to the necessity of requesting our legislature to take some action to prevent the spread of insects and diseases in our orchards, particularly of the trypeta or apple maggot and the disease called black-knot of the plum. Your committee, realizing the importance of prompt action in behalf of our fruit interests,—Recommend that a committee of three be appointed by the Chair to gather what information they can relative to the subject and report at the next annual meeting of the Society.

The report was accepted and adopted, and President Pope appointed: Professor W. M. Munson, Willis A. Luce and S. H. Dawes.

Mr. C. E. Wheeler, for the committee on resolutions, reported resolves as follows:

*Resolved*, That we hereby tender our thanks to the railroads and press of the State for the reduced rates and kind notices

To the people of North Knox and the proprietor of the Burton House we wish to express our appreciation for their many courtesies.

*Resolved*, That we are mindful of the care and pains taken by our member, Alonzo Butler, that this meeting should be a success.

MEETINGS OF EXECUTIVE COMMITTEE.

February 27, 1893. With the approval of Messrs. Pope and True, the secretary this day contracted in behalf of the Society with Willis A. Luce to perfect and install the exhibition of Maine fruit at the World's Fair, under the contract made with the executive commissioner

March 1st. A letter was received from George M. Twitchell, Secretary of the Maine State Agricultural Society, having the following reference to the next annual exhibition:

"I am authorized by the President of the State Agricultural Society to extend an invitation to the State Pomological Society to hold their exhibition for 1893, in connection with the Maine State Fair, September 5-8, upon the same terms as in 1892."

In behalf of the executive committee the secretary with their approval accepted the invitation.

October 26th. Meeting at Winthrop. The secretary presented the schedule of awards made at the annual exhibition of the Society, amounting to $542.85.

*Voted*, That the treasurer be and hereby is instructed and authorized to pay from the treasury of the Society the premiums awarded at the annual (1893) exhibition of the Society, as per schedule of awards submitted by the secretary.

*Voted*, That the Treasurer be and hereby is instructed and authorized to hire to meet the current expenses of the Society a sum of money not exceeding five hundred fifty dollars, on demand or until such time as the Society shall be able to pay the same; that for the security of the same the treasurer is authorized to deposit such collateral for the permanent fund of the Society as may be necessary for the purpose.

*Voted*, To offer $50 in premiums for an exhibition during the Winter Meeting.

An invitation was presented by Mr. Luce from the President of the North Knox Agricultural Society to hold our next Winter Meeting at Union.

*Voted*, To accept the invitation, and that the President and Secretary be instructed to arrange for the date and programme.

December 6th. The secretary presented a communication from the officers of the World's Horticultural Society, regarding that organization, and it was voted to place the same on file.

# PUBLIC MEETINGS

OF THE

# Maine State Pomological Society.

PAPERS, DISCUSSIONS, ETC.

## ANNUAL MEETING, LEWISTON,

September 7, 1893.

## SPECIAL MEETING,

Conducted by the Executive Committee,

WINTHROP, October 26, 1893.

## UNION WINTER MEETING, UNION,

December 5 and 6, 1893.

# PUBLIC MEETINGS.

## PROGRAMMES.

AT ANNUAL MEETING DURING THE EXHIBITION.

Music, conducted by A. R. Smiley.

Maine Fruit at the World's Fair, Willis A. Luce, South Union.

Music.

Varieties of Small Fruit Best Adapted to Maine—consisting of short papers and discussions by Maine fruit growers.

Music.

SPECIAL MEETING, WINTHROP.

The Orchard, Conducted by President Pope.

Small Fruits, Conducted by Willis A. Luce.

Music, led by Charles E. Moore of Winthrop.

UNION WINTER MEETING AT UNION, DECEMBER 5 AND 6, 1893.

TUESDAY, 10 A. M.—BUSINESS MEETING.

Report of Treasurer.

Report of Secretary.

Other business matters.

TUESDAY P. M.

Address of Welcome, H. M. Lord, Rockland.

Response.

President's Annual Address, Charles S. Pope, Manchester.

Maine Apples at the World's Fair, Willis A. Luce, Union.

TUESDAY EVENING.

Music.

Paper, D. H. Knowlton, Farmington.

Music.

A Demonstration in Apple Cookery,

Miss Anna Barrows, School of Domestic Science, Boston.

This was a lecture illustrating the process of making palatable dishes in which fruit is used. Miss Barrows used a stove and showed results.

Music.

WEDNESDAY A. M.

Paper, Charles E. Wheeler, Chesterville.
Discussion.
Plum Culture, S. D. Willard, Geneva, N. Y.
Discussion.

WEDNESDAY P. M.

The Orchard,
Conducted by Charles S. Pope, and J. W. True, New Gloucester.
Discussion.

WEDNESDAY EVENING.

Music.
Children and Plants, Mrs. Helen B. C. Beedy, Bangor.
Music.
Home Surroundings, Professor W. M. Munson, State College.
Music.

## PAPERS, DISCUSSIONS, Etc., AT THE STATE FAIR MEETING.

### VARIETIES OF SMALL FRUITS BEST ADAPTED TO MAINE.

It is very gratifying to note here that the culture of small fruits in the State has very largely increased within the past ten years. Largely through the efforts of our society the people of the State have been taught the *how* of small fruit culture, and they have also become aware of the fact that small fruits will do as well in Maine as in other parts of the country. There is now a general feeling among our people that it is possible for all who may have the land to grow what small fruits they want and some to spare. A few years ago Maine farmers would tell you that they did not have time to plant strawberries and take care of them. To-day they are inquiring about the best varieties to plant and where they may

obtain them. In other words they quite generally conclude to please the women folks and have a few berries for their own use. With this in view some of the growers of Maine speak of the different varieties of small fruits best adapted to the State. The culture is now pretty well understood by those who are ready to set out the plants. What kinds shall we set out? is the inquiry, and these suggestions are only to answer from the experience of Maine growers this question.

Mr. Horatio Clark of New Portland, though not a very large grower of strawberries, raises a large number of varieties and raises them very successfully. We have never seen better strawberry plants growing than those found in his beds. In reply to questions addressed to him he writes that he has grown a large number of varieties, but finds that the Bubach No. 5, and Haviland do the best with him. The Crescents do well for one or two seasons and go out quick. Havilands will stand more droughts and winter frosts than any variety he has raised. Mr. Clark the present season produced some over thirty bushels.

Mr. W. H. Allen, gardener at the Maine Insane Hospital, writes:

AUGUSTA, August 21, 1893.

We do not grow a very large quantity of small fruits but we have what we call a good quality of each and consider them as profitable as anything in the garden department. For strawberries we grow Bubach as Pistillate and May King as Bi-Sexual. They gave us eighty-six bushels on a little over one-half acre and would have had a great many more were it not for the drought.

Raspberries, the Turner is our early kind, good and productive. Cuthbert for late and I know of no better.

In blackberries we consider the Snyder as a good standard berry and grow it exclusively.

The Currants, our main crop, is the Versailles (or cherry) and White Grape, and we find them both very fine and exceedingly productive; we have a few Fay's but they are young and have borne but a few this, their first year, but they promise well, and I think we shall plant more.

We have but few gooseberries of the Downing and Smith's Improved, and (as I am giving my own experience in the other kinds I can say but little of these as yet) what few they have borne were good in size and quality, this being their first.

W. H. ALLEN.

Mr. B. M. Titcomb of Farmington, has kindly furnished the following information in regard to the matter under consideration:

I am raising the Cuthbert raspberry and the Wilson and Crescent strawberry. Can some one tell me of a better plant to set with the

Crescent for a fertilizer than the Wilson? The Wilson makes a slow growth and winter kills. I have learned by experience that I am going over too much ground for the amount of fruit. This season I raised 4,000 quarts of strawberries to the acre. In the future I am going to try for 6,000 quarts to the acre. It will cost no more for cultivation. I shall set sixty rods of raspberries this fall with the intention of seeing how many berries I can raise to the rod.

Mr. S. H. Dawes of Harrison, who is one of the most enthusiastic and successful fruit growers in the State has tested a large number of varieties, but as will be seen by what he recommends that he does not consider the list of profitable varieties a very large one. Here follows abstracts from his paper and his list:

I commenced the cultivation of strawberries about seventeen years ago with what was then called the Green Prolific, and soon learned that it was a fraud and that there was nothing prolific about it. I then tried several other varieties, among which was that good old standby, the Wilson, which was the best of them all then, and is as good now as it ever was. I believe the most we read and hear about the deterioration of this and that kind of fruit is nothing but starvation; and if you can procure good, healthy Wilson plants, and not starve them to death, they will produce as well now as they ever did. I continued their cultivation for my main crop, and was quite successful in a small way, but was all the time fooling with all the new sorts I could hear of till I was induced by one of my friends to try a few plants of the Crescent Seedling. I received the plants quite early in the spring, and was forcibly impressed with their inferior looks, and had many misgivings in regard to them; but I set them out and gave them the same cultivation that I did my others, and they grew and multiplied wonderfully, and when they came to bear the following season the vines were a complete mass of fruit and astonished all that saw them. I have continued their cultivation from that time to the present and they show no sign of deterioration, for my crop was the best this (1893) season that it ever was since I have been in the business. I know that many claim that they must be fertilized with some staminate sort, in order to give the best results. I have experimented somewhat, in order to satisfy myself on this point, and have arrived at the following conclusion: that I can raise more fruit at less cost with the Crescent Seedling without any staminate sort near them, than I can with any other variety I have ever tested. But from the experiments I have tried the last few years, I am equally well satisfied

that I can get a little nicer fruit and more of it by having them fertilized with some staminate variety, and for the last two years I have mixed the Wilson and Crescent together, say about one plant of the Wilson to three or four of the Crescent, and the result has been highly satisfactory. From my own experience and all the evidence and information I can get from books and papers published over the whole county, if it was left for me to say, I should crown the Crescent king, and Wilson queen; and when you have joined and grow the two together, as they should be to produce the best results, you obey Nature's law, and have the most prolific family of luscious fruit known to this Society.

For a red raspberry the Cuthbert, all things considered, stands at the head (although there are several others nearly as good). It is of the largest size, a good shipper, the most prolific, of good flavor, brings the highest price in the market. Its season lasts from four to five weeks and is every way satisfactory when it is properly treated and cared for. For a yellow variety I would recommend the Golden Queen. It is a good yielder but not a good shipper, nor is its flavor equal to the Cuthbert. But a few boxes of them properly arranged look well in a crate and a few put up in glass jars and set beside those of darker colors make an agreeable contrast.

Black Caps are a noble berry, and every one should cultivate enough for his own use if no more. I have tested several sorts and if I was limited to one variety I should choose the Seneca Black Cap first and the Gregg second. The Seneca is a great bearer, and perfectly hardy. I have grown them successfully on the same ground for years, and they have given perfect satisfaction. The fruit is not quite as large as the Gregg but fully the size of Mammoth Cluster and the other sorts and stands our winters much better. They make the nicest pastry I ever tasted and when the proper amount of sugar and cream are used they make a dish fit to set before the king.

There are several varieties of currants—the White Grape, the Reds and the Blacks. I have had no experience with the Blacks and cannot judge of their merits. But the White Grape should be highly recommended and its cultivation increased, for it is the best of the whole family of currants for table use and a dessert fruit. I don't think there is much difference in the leading varieties of the

Reds, and you will make no mistake if you select either of them, the Cherry, Fay's Prolific, or Versailles.

We will now notice some of the small fruits that are grown on thorny bushes. In Matthew I think the question is asked "Do men gather grapes of thorns or figs of thistles?" And St. Luke, if I recollect rightly, in alluding to the same subject calls it the bramble bush. Both referring to the impossibility of growing good fruit on such mean scrubby bushes. And it was impossible in those days, but times have changed. The desert has not only been made to blossom like the rose, but we get some of our best fruits from the worst thorns and brambles I ever saw And if we do not gather grapes and figs from them we do something just about as good. Where will you find a worse thorn and bramble, or a much better fruit than a good, well ripened Snyder blackberry, or a thistle that will prick worse than the thorns on a Smith's Improved Gooseberry bush? And yet their fruit is about equal to the grape and fig, and I can heartily recommend them both as the best of all others of their kind for a general market crop and for home use. There are many inducements why the cultivation of small fruits should be encouraged. They are not only the most profitable when rightly managed but the proceeds are more regular and sure. There is no off year in the business as with orchard fruits, neither are they so sensitive to drought and rains as are our common field crops. But there are other and higher considerations of a moral and social nature that should be prized of far more value than mere dollars and cents. There are no demoralizing influences connected with it, as there are with the trotting horse and the race course, neither are men so subject to disappointment and losses. It not only brings a man in contact with the most intelligent portion of society, but it is so attractive and elevating in its nature that the ladies, who constitute the best half of our community, can engage and become co-laborers in their cultivation And when you take all things into the account, the ins and the outs, the ups and the downs, I think that for a young man especially who intends to follow rural pursuits it has more attractions and advantages than any other branch of agriculture, and he can do no better than to engage in their cultivation.

Prof. W. M. Munson from the experiment station sends out a general bulletin on the "Varieties of Fruit" best adapted, or growing most successfully in the State at the present time. From this the following varieties are recommended for Aroostook, Piscataquis,

Northern Somerset, Penobscot and Washington counties: Agawam blackberry, Cuthbert and Tyler raspberries; Fay's Prolific and White Grape currants, and the Houghton gooseberry.

For Oxford, Kennebec, Waldo, and the southern counties, the following varieties are enumerated: Cuthbert, Golden Queen, Shaffer, and Gregg raspberries; Agawam and Snyder blackberries; Fay's Prolific, Versailles, Victoria and White Grape currants; Downing, Houghton and Smith gooseberries; Bubach No. 5, Crescent, Haverland, Sharpless and Wilson strawberries.

Professor Munson adds that the varieties named are the ones most commonly grown at the present time. It is believed that many of these varieties (especially of the small fruits) will soon be superseded by some of the newer introductions, even as the Hovey strawberry, Knevett raspberry, and Dorchester blackberry have given place respectively to the Crescent, the Cuthbert and the Agawam.

## AT THE WINTHROP MEETING.

### ORCHARDING.

President POPE Conducted the Speaking on this Subject.

As a result of his success in orcharding he presented many helpful and practical ideas on the starting of the orchard. The location being determined, the first essential to success is to obtain good trees. In the purchase of nursery stock too often the price rules regardless of the quality. A mistake made in setting poor trees can never be corrected. Get trees as near home as possible, but be sure to get good ones. Don't set Baldwins that have been grafted in the nursery. He had practiced setting seedling trees, and grafting into the limbs as soon as the trees are of sufficient size. He has set Ben Davis, Haas and Talman's Sweet, these being hardy varieties. After the trees are well grown he grafts into the limbs Baldwins and such other varieties as he may desire.

Experience has taught him many lessons as to the time of setting trees. He used to wait until the soil was in good condition for planting corn, but now he sets his trees as early in the spring as the frosts and rains will permit. The trees should be set before the

buds swell, so as to give the roots a chance to start before the leaves begin to grow. If the roots get an early start the tree will make a better growth the first year. There is a great advantage in grafting your own trees, for in this way alone you are sure what varieties of fruit you are going to have when the trees begin to bear. There are few orchardists who have bought trees without being disappointed when the apples appear. All over the State thousands of trees have not proved true to name.

It will avoid sunscald in the trees if they are inclined a little towards the southwest. Great care should be taken to have the soil firmly pressed down about the roots. As a rule he never cuts back the limbs of the tree he is setting unless they are bruised. If the roots are short, and there are too many limbs, cut off the lower ones. Sometimes when the last year's growth is large, or there are few limbs, cut back the limbs so as to be in proportion to the roots. Did not believe in setting the trees in the fall. It might do to get ready in the fall, but he would wait till spring before he set trees. If trees are to be set in the fall they should be set early in October.

In setting out trees, the distance should be determined somewhat by the variety. The upright growers may be set as near as twenty feet of one another, but more spreading varieties like the Tompkins, should be forty or forty-five feet apart. The most desirable size of trees is three-fourths of an inch to an inch in diameter. After the trees are set for several years a hoed crop may be grown to advantage, though you cannot expect a good crop from the ground and another from the trees. It is a very good idea to mulch the trees when they are first set, as the mulch will keep the soil moist and keep back the grass. He did not believe that anyone in Maine had been guilty of applying too much manure to orchards, there is rather danger in using too little so that the trees suffer for a want of sufficient plant food. Ordinary manure from the yard and stable is good enough, but if commercial fertilizers are to be used bone meal and some form of potash are the most desirable.

Willis A. Luce followed with the results of his own experience. The supply of manure has been insufficient and to increase it he has pastured both sheep and hogs in the orchard. Pigs will do good work but he objected to old hogs as they learn how to get the apples off the trees and sometimes damage the trees. Hogs will work over the surface and leave it nice and mellow, though he had never been able to make them level it up. Both sheep and swine eat the wind-

falls and wormy apples, and in this way are very valuable aids to the orchardists. From an orchard pastured with swine last year he has raised a good crop of apples this year. There are fewer worms when the apples are used up in this manner. He seemed to think the apple trees needed potash more than any other fertilizer.

Professor Munson added that potash was the fertilizer most needed by bearing trees. Hard wood ashes are perhaps the best, as they contain both potash and phosphoric acid. Ashes and ground bone applied together make an admirable fertilizer, and the potash gives the fruit the most delicate flavor. Some one asked if salt was good, and the professor replied that salt of itself had no fertilizing value, but its mechanical influence is often beneficial in causing the soil to give up fertilizing material for the plant. Eight to ten bushels to the acre will be a sufficient quantity of salt to use.

W. P. Atherton of Hallowell told the mistakes he made in setting trees too near together. Somehow he was unable to look ahead and see how large the trees were going to be. He referred to Dr. Hoskins, who advocated setting trees thirty by fifteen feet and then cutting out every other row, after the branches begin to meet. In fertilizing he had used all the manure of the farm. He had tried sheep and swine. He was much pleased with the work done in the orchard this fall. He was going to put on some bone meal and ashes, and harrow both in well.

Reference was made to the subject of pruning, and Mr. Pope, in response to several growers, said that for growth he would prune before the leaves start, but for fruit, prune in the summer. Large limbs he preferred to cut off in April or May. Wounds caused by pruning at this season will begin to heal over at once. Cutting limbs in summer gives the tree a check which tends to the formation of fruit buds. With young, healthy trees, it makes very little difference what the season is, but he thought pruning was often carried too far.

In the matter of spraying, Professor Munson stated that he was willing to go on record that spraying with the Bordeaux mixture would control the apple scab. Possibly there might be a question as to the best time in which to apply it. The ravages of the Codlin moth are very much reduced by the use of Paris green. Use one pound to 250 gallons of water. Spray after the blossoms have fallen.

Secretary Knowlton spoke of the importance of setting an orchard in good land. It does not pay to use rocky or hilly land, that cannot be cultivated. Good orchard land in most parts of the State can be had for $10 to $50 an acre. He also spoke of the individuality of varieties of apples. Each has its own flavor, color and size. Each, likewise, has its likes and dislikes of the plant food within its reach. He hoped the time would come when more would be known of these individual properties, so to speak, of the fruit and the tree.

## SMALL FRUITS.

Mr. Willis A. Luce, who has had a wide experience in the cultivation of small fruits for the market on his farm in Union, spoke of the profits of strawberry culture, and then said any land that would grow corn to advantage would grow strawberries to a fair crop. Make the ground smooth before setting the plants, and have the rows straight, four feet apart, and the plants twenty inches in the row. Straight rows permit the use of the cultivator without danger of tearing up the plants—and it also permits of working close to the plants. Spread out the roots carefully and press the dirt firmly about the roots, and be careful to have the crown of the plant come about the same as it grew before it was removed. Two good hands will set about a thousand plants a day. Cultivate as soon as the weeds start and keep it up through the season. Cut off the first runners and do not permit the vines to bear any fruit the first year.

He recommended the following varieties: Crescent Seedling first, then Charles Dowing, Wilson, Jessie, Sharpless, Parker Earle, Manchester, Bubach. He also recommended Michel's Early and thought it a good variety to set with the Crescent Seedling. He used swale hay for covering in the winter to prevent injury from freezing out. Use most of the mulching between the rows and put only a slight covering over the plant itself. Strawy stable manure also makes a good mulch. Girls make better pickers than boys as they are more careful. In marketing use only clean boxes and crates, and offer only good fruit.

Other small fruits require about the same conditions of soil; raspberries should be set six feet apart, and blackberries eight, currant and gooseberries in rows six feet apart and the plants three feet.

Secretary Knowlton followed and briefly referred to the ease with which enough fruit for the family can be raised. Set strawberry plants in long rows three or four feet apart, and let the old horse draw the cultivator through the first season as often as once every week or ten days. Pinch off the blossoms and the early runners. Then if you don't want to do more, the plants will take care of themselves, and the following year without any care will bear a good crop of berries. In the interior of the State mulching is not necessary. The snow is a good mulch and will hold the plants in place. Near the coast mulching is necessary, and in the interior it will do no harm. He spoke in praise of the Bubach and Haverland; the latter the past year was a great favorite with him. The berries were large and of fine flavor, while the vines are strong growers and free from rust and blight.

## AT THE UNION WINTER MEETING.

### THE ADDRESS OF WELCOME.

By H. M. Lord, Rockland.

*Mr. President, Ladies and Gentlemen:*

It is rather a peculiar and rather a unique task imposed upon me to-day, that of welcoming a convention of agriculturists, the Maine State Pomological Society and its kindred organization, the State Board of Agriculture. I say a unique task, inasmuch as I am not a fruit grower in any sense of the term or even an agriculturist unless it may be in some very liberal interpretation of the term. I am a representative of that great class, the consumers, and the consumer has, or should have, a more vital appreciation of anything produced by Maine than the producer himself. So it may be from some such reason as this that I am selected to extend to these two societies the sincere words of greeting which at their best inadequately express what fills the hearts of all those who live in this part of the State. The appreciation of the work that this society has done and is doing is not confined within the limits of the State of Maine, for so far as the reputation of Maine products has extended just so far has the reputation of these two organizations reached. And who shall attempt to

define the limits beyond which the good qualities of Maine products are not well known and appreciated. Every year across the great ocean mighty steamships carry thousands of barrels of these tempting spheres which have budded, blossomed and fruited on the fertile hillsides of this State. Unmindful of Bunker Hill and the battlefields of 1812, in return for bullets and grape-shot which made children fatherless and mothers and children homeless, we send back to our English cousins bullets and grape-shot of tempting exterior carrying assurances of life and health and strength and good cheer, and it takes across the water with it a message of God speed, and carries with it a breath and aroma of freedom and liberty to that great kingdom which must inevitably follow the example set by its precocious colony and lay aside the monarchical form of government and take its place in the rapidly swelling ranks of the republics of the world.

I have learned to appreciate the fruits of Maine fully. I was located for many months in the South where the velvety peach waved before my eyes, the pineapple with its palatable interior lay at my feet, the orange yellow and saffron, almost bursting with its pent-up sweetnes, snodded to me on every hand, the grape fruit demanded my recognition and the persimmon, creamy and sweet fell around me; but I would willingly have given them all for a taste of a good Maine apple. In the far West I made my home and the luscious fruit of the western country threatened my fealty and lay claim to my appreciation, but I would have bartered all of these prides of the Pacific for a ripe, juicy apple. I seemed to see as in a mirage the picture of my own state. I could see its productive farms and the heavy laden orchards in the sunshine. I saw the Nodhead as it beckoned to me over some rustic fence. I saw the old reliable Baldwin, suggestive to me of the days when it played so important a part in filling the depths of the capacious Christmas stocking borrowed for the purpose. I remembered the days of my boyhood when the well-filled barrel of apples was placed in the cellar. I recollected how forth to school I went with pockets bulging out with well selected favorites. I have experienced joys and sorrows, I have met successes and reverses, I have made money and lost money since then, but never have I experienced such strong satisfaction as when my capacious barns were filled almost to the bursting point with the products of my own orchard. Never did I so sincerely regret the reverses of fortune as when I lost my beloved watercore and found a decayed interior.

It was in such pictures as these that I learned to appreciate the State of Maine, that I learned rightly to estimate Maine joys, Maine people and Maine fruits. I learned to realize to the full that Maine was plenty good enough for me. So I heartily and honestly welcome you here to-day. We know what good fruit is because we produce it. We know good fruit growers because we have them in our midst and they make our most thrifty and well to-do people. Again, in behalf of the great class of consumers which I repre-ent do I welcome you here to-day. You are known to us by reputation. You have come to a place where the open hearts of the people prompt an open hand. The land is yours to enter in and possess it. It may not be like the land of promise, flowing with milk and honey, but it is flowing with the milk of human kindness and extends a sincere welcome. It is our wish that your stay here may be so pleasant and profitable that when the hour comes to depart you may be able to say in all sincerity, "It is good to have been here, soon may we come again."

## RESPONSE.

By F. S. ADAMS, President of the Board.

*Mr. President, Ladies and Gentlemen:* It is somewhat embarrassing to be called upon at this time. I came here to meet you, intending to take no part in the proceedings of the meeting. It is impossible for Secretary McKeen to be here to-day, because of engagements in other parts of the State. I was very glad to listen to the kind words of welcome from our brother. I had not got off the train before I was met by Brother Butler, and I realized that you people had warm hearts and extended to us a hearty welcome. The cultivation of fruits is an old and honorable occupation. A man or a woman engaged in this occupation, I find, always has a large heart. It is because they are so closely in connection with nature and nature's heart that it is impossible to be a fruit grower and a mean man. We read in the Bible that the first parents found fruit in the Garden of Eden. It has been an important industry since the creation of the world. People are learning to appreciate fruits.

There is more consumed now than ever before. The markets all over the world are opening up, so that no man may be discouraged by going into the fruit business. The cultivation of small fruit

should succeed more and more. I believe every farmer should raise enough for his own use, if he does not raise them to make money. He who don't provide small fruits for his own table is worse than an infidel. There is no reason why we should not have these small fruits. It makes a great difference in the cooking of the family. Berries take the place of pies, etc. The fruit growers of Maine and the members of this Society, I can assure you, are working in harmony. What is for the interest of one is for the interest of the other.

We thank you for your cordial welcome here to-day. We knew before we came here we should receive a cordial welcome. I want to say a word about your beautiful town. I have always heard that the town of Union was the most beautiful town in the State but the half has not been told.

## PRESIDENT'S ANNUAL ADDRESS.

By CHARLES S. POPE, Manchester.

For twenty years I have not failed to meet the fruit growers at our winter meeting, and it is with pleasure and increased interest that I again greet you.

The question often presents itself when pressing duties are demanding our attention, as we leave home to attend these meetings, Does it pay? What do we receive in return for possible losses? Our answer is, we here meet practical men who are willing to give us their methods and practices, many of which are improvements on our own and we may even learn much from a recital of their failures. The specialists will open up new fields and show us a better road to success. The topics presented, intelligently and broadly discussed, will lift us from old ruts and help us in these days of sharp competition to practice those methods which will give us a profit in the business, instead of a loss. We shall also feel richly repaid for the time spent if we are able to so present the subject as to encourage others who have heretofore taken no interest in horticulture, to cultivate fruits and flowers and share with us its pleasures and profits.

I am firm as ever in the faith that the growing of apples and small fruits, can be made a source of profit, not to the ignorant or indolent but to the expert, in this as in most other branches of busi-

ness. Those who attempt to raise fruit without extra care may obtain a good crop in years of plenty, when of course prices are so low that the receipts will barely pay expenses, but the art of raising a good crop when prices are high is what we are seeking for, and those who, by good cultivation and extra care, can guard against the ravages of insects and diseases will receive bountiful returns for their labor.

It is with great pleasure that we note the increased interest taken by our farmers in supplying the family with small fruits. Would that I could impress upon every farmer the necessity of having, not only a good vegetable garden, but could show him the ease with which bushels upon bushels of small fruits can be produced at a cost but a little above the expense of raising corn or potatoes. Too many of them look upon small fruits as a luxury only, forgetting that our health requires, particularly in the summer, the acids which are here supplied, and that his table can be furnished with a dessert more palatable and much cheaper than cake and pastry. Few people who have depended upon the market for their berries, can realize how delicious is the strawberry or blackberry as grown in the home garden and allowed to remain upon the plant until thoroughly ripe, and having enjoyed such fruit, we venture to say, the fruit garden will not be neglected.

For several years our Society has assumed the management of the horticultural part of the exhibit of the Maine State Agricultural Society at Lewiston. We are thus obliged to hold our fruit exhibit before our winter apples have matured, and if we continue this practice, I would recommend offering liberal premiums for an exhibition of fruit at our winter meeting. This would necessitate holding the meeting early in the winter, if we would secure a fine exhibit of late autumn and winter fruit.

The practice of making an exhibit of our Maine apples whenever an opportunity offers, should be continued, to advertise our fruit and secure more buyers. We should feel satisfied with our success in obtaining premiums, whenever we have made a display in competition with other states.

I desire to call your attention at this time to the necessity of requesting our legislature to take some action to prevent the spread of insects and diseases in our orchards, particularly of the trypeta or apple maggot, and the disease called "black-knot" of the plum. If our people fully understood the character of this

fungus we think they would see the reasonableness and necessity of a law to prevent its spread. There is no justice in allowing a careless, heedless man to contaminate the atmosphere with fungus spores and thus make it impossible for others in the vicinity to raise plums and cherries.

The laws in some of our Western States and in foreign countries are very strict in this matter and we see no way to prevent the spread of some insects and diseases unless the careless orchardist is obliged by law to assist in exterminating the same.

The assistance of scientific men in giving us a remedy for the scab and the codling moth should be appreciated more by our orchardists and until they find some way to help us destroy the trypeta and prevent the black knot, we must rely upon the united effort of every fruit grower, to prevent the spread of each of these pests.

The partridge has of late become such a nuisance in some orchards that it is about time to ask for a bounty on his head, in those towns where he is known to destroy the crop year after year, and even to ruin the orchard entirely. Not being satisfied with the fruit buds alone he will sometimes take the leaf buds and tips of twigs, until the tree is a veritable scrub. We believe our horticulturists should ask more of the Experiment Station. Many questions of vital importance have come up which need to be settled by years of careful experimenting. Something has already been done to prevent the ravages of diseases and insects, but we need also experiments in fertilizing, pruning, adaptability of varieties to climate, and many other points, which are too expensive, or require more accurate experimenting and more time than the common orchardist is able to give.

We remember reading a few years ago, a scheme of one of our western horticultural societies, to obtain members which we think might be tried here to advantage. Fruit trees and plants of recent introduction, and which promise to be of value, are distributed annually to the members. We could in this way without doubt add largely to our membership and also awaken an interest in fruit growing amongst those who would be reached in no other way. It is our expectation in the future to have more money to expend and then the Society will be able to extend its work. There are many topics which ought to be brought forward, as we can find time, beside fruit growing. Few understand packing as it ought to be done. The transportation of fruit and marketing are serious

questions, and more than this I believe we should urge our people to spend a little more time to beautify the home. Let me say a word for what is commonly termed the sentimental. I mean love for the beautiful, which I sincerely believe, should be carefully fostered and cultivated in our children, as a means to develop character, tending to positive manhood and womanhood. The love of the beautiful is not mawkish; it never detracts from, or in any way interferes with the practical or business abilities of a man. It gives rather a genuine meaning to life, more satisfactory because on a higher plane than the mere bread and butter ambition. Have we not as a Society overlooked this phase of the subject too much and expended nearly all our efforts in instructing farmers how to make the most money possible? The farmer who has not mistaken his calling will be mindful of planting ornamental trees, shrubs and vines about his home, and supplement them with a good vegetable and fruit garden. The garden will pay a large per cent on the investment, even from a pecuniary point of view, to those who begrudge the time spent, in making the home, what it should be, a paradise on earth. I should feel well rewarded for my time spent here if I could induce one man to make the resolve and keep to it, that he would think less of adding to his bank surplus and spend more of his time and energy in gathering beautiful things about his home, and supplying all the fruits desired, both as a necessity and a luxury. Forever groveling as many farmers do, in raising crops which can be turned for cash, has dwarfed the soul, and some have even forgotten that there are higher and nobler things required of them.

## MAINE APPLES AT THE WORLD'S FAIR.

By WILLIS A. LUCE, Union.

*Mr. President, Ladies and Friends*:

It is rather a peculiar subject to talk upon. Some people who have come back from the Fair have not spoken very encouragingly of our exhibit. I am going to speak of the exhibit not as it was after the first of June but was before that time. What I wish to show most of all is, some of the disadvantages under which our Society has been placed and under which they labored in securing a Maine exhibit at the World's Fair, also that while the exhibit was in the care of the Pomological Society it was a credit to the State.

In the first place, the Society, late in the season of 1892, about the time of our annual meeting at Lewiston, were asked to go ahead in this matter and make arrangements for exhibiting Maine fruits at the World's Fair at Chicago. The question came up as to the amount of money that should be given for that purpose, and the executive commissioner said that $1,000 was all that would be allowed the Society. Of course any sensible man would say immediately that such an amount would be inadequate for so great an undertaking. Our Society hesitated and said they would not have anything to do with it, as the amount would not show Maine fruits as they should be and consequently would not show Maine fruits. That was the right conclusion. It is an important industry, bringing to our State nearly a million and a half annually, and the idea that only $1,000 should be allowed to represent it at the World's Fair was a disgrace to the State.

The fruit growers of the State came to the secretary and president and urged them beyond their better judgment that they should make an exhibit of Maine fruits. They knew that our fruit stands high in the market and we wanted to let the world know what kind of fruit we grow here in Maine; at the earnest solicitation of these men the society undertook the task and determined to do what they could for Maine at Chicago. A committee was appointed to collect all the varieties they thought would keep and put them in storage for use in the springtime, to send forward. The fruit was collected. Good specimens of each variety were selected as could be secured at that time. The committee labored under this disad-

vantage, the lateness of the season, as the time for gathering apples had passed. They would go to a man and say they wanted such and such fruit which they knew he raised. If this man had been asked in the summer to contribute this fruit the selection would have been better. Anyone who knows about this would know the difficulties under which the committee labored. While the fruit in many respects was not up to what they desired, it was the best they could secure with the means at their command. They secured forty-four to fifty barrels and stored them at the cold storage at Boston, and they came out in fine condition. On the twenty-seventh of March I was delegated to go and inquire into the condition of the fruit and ship them afterward to Chicago. We had trouble in securing a car for shipment, as we were obliged to have a refrigerator car, and after one was secured we found after being loaded it was marked for the shop, as it was disabled. All the way along it seems as if luck was against us. After a while we got the fruit started on its way. I immediately followed. On arriving at Chicago, I had the number of the car, and for some two weeks I tried to find on their books the number of the car that had been shipped, but never could. The fruit was taken out in the night. I was not present when it was done, nor could I find out just when it was to be done. They told me when I went to look at the fruit that it arrived in very bad condition. I knew we secured the fruit in the car in barrels and boxes, so that no amount of hard handling should be able to displace or break open the packages. They said the packages were broken badly and had shifted very much. I put the ideas together, that we could not find the number of the car, and that it had been marked for the shop before starting, and concluded it had been changed in transit, and that the fruit had not been properly packed when it was changed. If you have an idea of the number of cars going over the road you would be convinced that they are not very careful for at one time in May there were 5,000 cars waiting to be drawn into the yards and unloaded and I think that some of the very best fruits were lost in that way and what we did have, some of it was in bad condition owing to rough handling and the delay in unloading at Chicago. We encountered serious trouble even when there in getting our table, as every one wanted their work done at the same time. The space was changed several times. We hardly knew what to depend upon. We would take such space as they designated and then they would say that we could not have

it and when we finally got down to a space it was fifty-six feet long and four feet wide. That was for the Maine exhibit of apples and jellies and was in the south curtain. The table was not made here in Maine which was indeed a mistake. While we desired to do so at the time circumstances came around so that it was not, consequently it had to be made after we went to Chicago. This delayed us in getting upon our own space, I assure you. We had at the opening an exhibit of Maine fruits although it was not on our own space. At the time of my arrival they had been making flags in the south curtain and were just clearing out the remains. Not a thing was in readiness but a part of it was got ready even in time for the opening. I say we had a display at the opening but not being on our own space the executive commissioner thought best not to have as large a display as we were to make, so we put on 150 plates of apples of our best winter fruit and a few in jars. This was at the opening of the Fair. We were the only New England State that had an exhibit at that time, and were second to none of the others who did exhibit in the south curtain. I say this in face of what has been reported in relation to our fruit exhibit. I was there and know what I am talking about. The most serious difficulty under which we labored, was, that Maine is not and never has been in the show business. We were undertaking work we knew nothing about, which under any circumstances, is a difficult task. The Western States, just the minute the Fair was talked of, began with all the means they could secure and all the energy and push they possessed to prepare for the Fair to make the best showing they could for their state. All of these Western States are in the show business. That is one of the great purposes of their lives to show up their advantages. If you were there you realize very fully how they would show up these industries, especially the fruit growing business. They not only talked to you but brought such positive proof of the products of their soil that you were obliged to believe what they said. It was a great time in their existence as a state to make an impression upon the eastern people and bring more of them to the West where they have been drifting for years but not such large numbers now as in the past. If Maine had been in the show business, we too, could have been foremost in showing what she can produce upon her soil. I am not prepared to say it would have been the best thing for Maine to do, to put so much energy and time into an exhibit as many of the Western States did, but the

great use and purpose of the Fair was to show in an artistic manner the products of the world, and it was not always the best that secured the prize, but that that was shown in the most artistic manner. If you could have seen some of those fruit and agricultural exhibits, you would have been pleased. It was not always intrinsic worth nor quality, but to show in such an attractive way that they would bear off the prizes. That, it seems to me, is one of the mistakes of the Fair. They said in their circulars that quality should be first, but the quality is not in these insipid fruits brought us from the Rockies, although they are very beautiful to look at. When we come to test the quality of the thing, it is flat, and doesn't compare with our Maine grown fruits. I know that old Dirigo could produce and has produced as good fruits as were shown there, even in size, and we know they are better in quality. The states of Washington, Idaho, Wisconsin, as well as California, showed immense quantities of fruit, large and beautiful. They exhibited fruits that do not grow here. But when you come to compare our fruits with theirs, there is a difference; theirs is extremely overgrown in some instances, and when you get into it, the texture and flavor are wanting.

We moved to our own space the middle of May, and put on our full exhibit of fruits in jars in connection with those on plates. The jars were of different sizes and forms, holding from two quarts to seven gallons. There were upwards of fifty of these jars upon the table. When the fruit was first put up it looked very beautiful, and was admired by thousands. No preserving fluid has been found up to the present time that will hold the apple in its natural color for any length of time, and when I left the first of June the color was fast coming out, and this part of the exhibit was fast losing its beauty, and I am told that it was left on the tables in very bad condition. But we had no part in it after I left Chicago. It was in the hands of the State Board of World's Fair Managers, and whatever disgrace comes to the State of Maine does not belong to the Pomological Society, though it has been placed on us a great many times. Not but what I feel sorry for the State, but I don't want anything heaped upon us that does not belong to us.

In relation to the exhibit, Mr. Samuels, chief of the Horticultural Department, a man of great worth and judgment, came to me and said, "You have the finest exhibit of apples in the south curtain." I knew that but it was kind in him to say it to me.

We were given good notices of Maine's fruit exhibit in the Chicago papers, American Garden and Forest and Garden, also gave us kindly mention. Especially in the latter by Prof. Bailey which can be relied upon, as he is authority on all subjects pertaining to horticulture.

I understand by those who visited the Fair after I left, that the fruit was allowed to decay upon the tables, and it was very disgraceful indeed. I am very sorry if such was the condition. It has been brought up very many times in the press, but the blame belongs not to this Society, but to those in charge at the time. We have fruit in the State of Maine that we are willing to compare with any in the United States. We could have done better at Chicago if we could have had a man there to look after the exhibit. After I left one man was to care for eight, including Horticultural. Those exhibits at Chicago where there was not a man with it all the time to look after it, amounted to nothing. It was money spent in vain. I want to say this for the grand old State that we all love so well, that as a state we can grow and do grow as good fruit as the sun shines on; and as we come here to-day and see this fruit upon these tables it brings to my mind very forcibly this very fact and if we should ever have another opportunity of showing our fruits and making a display in our country I believe we want to take hold of it as a fruit organization and not depend upon any assistance from the State or State officers and then we can have an exhibit of fruit that would be an honor to our State even through the entire period.

In the line of comparison, California put a million into her World's Fair work and we put only fifty-seven thousand. You can make the comparison and can see how we would stand. While we did make an exhibit as a society it was a credit to the State of Maine.

## A SCALE OF POINTS FOR JUDGING.

By D. H. KNOWLTON, Farmington.

We are all guilty of more or less irregularities, and we owe it to ourselves to guard against them as fast as we learn of their existence. In this way we may hope to reduce them and improve our condition. In the management of the affairs of our Society we have endeavored to avoid irregularities and have our affairs in a business-like form. With this in view, our records are complete and our treasurer's books are full each year since the Society has been doing business. There was a roll of members, but unfortunately in the Farmington conflagration in 1886, this book was overlooked and with many other valuables was destroyed. Our published transactions and the treasurer's records, however, show in more definite form, just who our members are at any particular time. Our Executive Committee on all matters not otherwise covered by general rules have passed and recorded definite votes. We have recommended that our treasurer open a ledger account in detail with our permanent fund, so that at any time his books may show how this stands, and we understand he is going to do so.

There have been more or less irregularity in the manner of conducting the exhibition. I do not see how we could possibly enforce, what in some societies proves a very important rule, that all entries shall be made in advance of the exhibition. Our exhibition comes so early that no one who cares to make a good display of fruit can tell what he has until the last hour before the fair. But other rules we are enforcing and we think our exhibitors and the public are well pleased with them. We should have a few more rules or else make a general rule that will cover all. In regard to the number of specimens of fruit, there should be a limit in justice to all, and I hope another year we may see this point gained.

Our State Agricultural Society has found it very much to their advantage to have a scale of points for judging of the merit of the animals on exhibition. The Massachusetts State Board of Agriculture the past year published and sent out for the use of local agricultural societies a scale of points, covering the live stock, vegetables and fruit. Secretary Sessions who was with us at our exhibition this year, said the plan was working well with him.

The following scale of points for judging fruits, is the one referred to:

SCALE OF POINTS FOR JUDGING FRUITS.

| | No. of points. | Score. |
|---|---|---|
| Quality | 20 | ..... |
| Form | 15 | ..... |
| Color | 15 | ..... |
| Size | 10 | ..... |
| Uniformity in size | 20 | ..... |
| Freedom from imperfections | 20 | ..... |
| Perfection | 100 | ..... |

[The speaker with the aid of Professor Munson scored several plates of fruit to illustrate the use of the scale of points.]

At our exhibitions frequently we have had as many as fifty plates of Baldwins, and before the committee were able to pass on the prize plates it has been found necessary several times to weigh the fruit. Sometimes it has happened that the first premium was divided between two exhibitors, because the committee were unable to determine which of two plates was the better. A scale of points, properly used, would oftentimes determine this simply by adding up a short column of figures. These results, as a rule, are found out by some one other than the judge, so that he is not expected to know what story the figures may tell.

Now, there are other advantages connected with this system of making awards. The most important, perhaps, may be found in the educational work these scores will quietly bring about. An exhibitor is entitled to the score. He has it as an evidence of the appreciation others have of his exhibit. He can study it, and learn just how the result is reached. He can then for himself compare his exhibit with his competitors'. The next time he makes an exhibit he is going to be careful to improve over the previous year. So then the scale of points will show the exhibitors in what respects this or that exhibit is better than another. A wise man is made wiser by knowing his follies, and only the fool fails to improve, when the opportunity offers.

There should be a condition or conditions something like this: In order to receive the first premium the exhibit should score at least seventy-five points, and no exhibit should receive any premium that does not score fifty or more points. This past year in several instances when there was only a single exhibit second premiums were awarded. In two of them complaint was made, but if a scale of points had been used, we doubt if either would have scored fifty points.

I have written to several horticultural societies to ascertain what system of making awards prevail with them, but I have as yet got very little information that is of any value. The Massachusetts Horticultural Society on fruits use the scale of points to which reference has already been made.

Mr. Elijah A. Wood, who was with us last fall writes under date of October 8, 1893:

Yours of the 2nd inst, at hand. The only scale of points used by the Massachusetts Horticultural Society is the one adopted by the Massachusetts State Board of Agriculture on fruit. There is no scale on flowers that I know of. The Massachusetts Horticultural Society has adopted a scale on Chrysanthemum plants which is as follows: Size and form of plant, 25; size of bloom, 20; general effect, 30; foliage, 25. This of course could be adopted for some other species but could hardly be used for all. It is the only scale of points used in floriculture that I know of.

Yours respectfully,
ELIJAH A. WOOD.

In regard to the use of a scale of points, there is more work in awarding premiums, but the results are of far greater value since everything about the system requires care. The results too are definite and satisfactory to exhibitors. But this requires what it is not always easy to obtain and that is an expert judge who is competent to measure correctly the different points that make up the score.

In the county fairs, with which I am familiar, there is great looseness in making up the awards. Merit, which should always be the first consideration, for various reasons is often overlooked, and one of the chief objects for which a fair is held, is thereby defeated. While our Society has no jurisdiction over these organizations, it is not our province to dictate or even offer suggestions as to how the affairs of the society should be conducted. Yet I have thought we might in some way pleasantly get the subject before them and urge them to adopt more efficient methods of awarding fruit

premiums. At the same time a scale of points could be explained, and we have no doubt that in a few years some advance could be made. This could be more easily done if the Board of Agriculture would in some way unite with us in making such recommendations.

Now that I am speaking of the county fairs I am also reminded of the meagreness of the premiums offered for fruit. I should be glad if I could give you at this time the figures. The fruit and flower department of the State Agricultural Society costs that organization $500 and the premiums awarded in the other departments is about $12,000. Local societies give as low as twenty and fifteen cent premiums for single varieties of apples, so small only the most enthusiastic fruit growers will bring out their fruit at all, but for a horse trot that has nothing ennobling or helpful to the farmers the awards frequently amount to hundreds of dollars. The fruit industry is bringing thousands of dollars into the State and in several counties is becoming one of the most important, while the horse industry has ruined the prosperity of hundreds of farmers and at the present time has literally loaded the farmers down with unprofitable hay and grain eaters, that nobody wants to buy at any price, and we fear the worst is not yet reached, for the unprofitable creatures must be fed and cared for until there is some way for the unfortunate farmer to dispose of them. You may call it, if you choose, an "honest industry," it is proving nevertheless an unfortunate investment for the farmers. There may be some way in which our society could exert an influence that would lead to more liberal premiums for fruit. It is proper that the public should know how little recognition the farmers themselves are willing to give one of their own leading industries. This is an injustice that should not be continued, and we do not believe any industry will suffer by having each receive its full share of premiums at the fairs.

DISCUSSION.

S. D. Willard: Mr. Knowlton referred to the fact that your premiums at your State Fair were not what they ought to be. I have recently, as one of the executive officers of the New York State Agricultural Society, been through that mill myself. I know pretty much how it is. Our exhibit of fruit at the state fair got run down so it was almost a sham. Our county and no other county would exhibit what thay had at the state fair, simply because the premium list was not what it ought to have been. I conceive it was, from his

report, in the same shape yours is here to-day. A few years ago the president of our state board asked me to take hold of it. I said, "No, I will not do it. I am not going to be the monkey to pull the chestnuts out of the fire in that way. I will tell you why; you will give to the horse breeders, the cattle breeders and the pig breeders all they ask for, but you will not give us respectable premiums in our department." They said if I would take hold of it they would give me just what I pleased. I said, "if you will endorse what I do you will have to revise your whole premium list." Instead of $500 which they had given us, I asked for $2,000. The cattle dealers had to pull down their premium list a little. I said, "I am going to have it, the board promised me what I wanted and I will be satisfied with nothing less." I got it. We offered a premium of $200 for the best and largest exhibit of all kinds of fruit from any organization or society; a premium of $150 for second. Then we went to work and raised our premium list all through, paying as high as $50 for the best exhibit of pears, $50 for plums and $50 for apples. The result is this year we were obliged to put up a large building, 150x50 for our fruit. This is an off year for the fruit, but for the overflow we had to put up a tent besides. It was the premium list.

## A DEMONSTRATION IN APPLE COOKERY.

By Miss ANNA BARROWS, School of Domestic Science, Boston.

Instead of saying much about apples at first, I will speak of the methods used in cooking schools so that you will understand our work. The cooking school in this country is comparatively a new thing. Those who are teaching are very dependent upon the experience of the housekeepers who have gone before. We are trying in the cooking schools to bring together facts and good suggestions to help the housekeeper, not trying to make things so elaborate that the housekeeper will not find the time to carry them out. The first cooking school in this country started less than four years ago, and cooking is now a part of the training in schools in large cities. I think all ought to have some knowledge of the preparation and cooking of food so if we have occasion we may be able to prepare food for ourselves or direct others.

The schools are not simply to teach cooking but certain knowledge of physiology is taught as well. Here we have to learn a great deal from the experiments of farmers in keeping stock. We learn from them that we need certain foods. The food which the human body needs is arranged in different proportions by different authorities. They all agree that we must have water, starch, fat, albuminous matter and mineral matter. We need a great deal more water than anything else, as three-fifths of the human body is water; next is starch, next fats and albumen and a small amount of mineral.

I have brought with me some bottles which show the comparative analysis of the apple, as prepared at the Massachusetts Institute of Technology: Water in one pound of apples, 85.79; pectine in one pound of apples, 5.81; sugar in one pound of apples, 7.22; organic acid in one pound of apples, .82; cellulose in one pound of apples, 1.5; mineral matter in one pound of apples, .5; protoids in one pound of apples, .36.

You will see that the apple does not contain any starch and that it does contain a large proportion of water, a large proportion of mineral matter and acids.

Apples combine very well with starch and we get from them the flavor we need. In all foods we need various proportions of starch and fat in order to make a dish which would be satisfying. We know that apples alone would not be a very satisfying dish. When combined properly with other ingredients we get something that is satisfying. A great many of our cooked dishes of apples are dishes which we have for desserts, and we are inclined to treat these things as if they were not solid substances. We look upon them as an addition to our meal and do not consider them as of any special value as food. We make the mistake of eating a hearty dessert after eating a sufficient amount of food. It would be better for us all if we ate more fruit and less substantial food. If we would take more watery food it would be better for us than so much solid food.

I will illustrate the method of teaching in the school while I prepare this dish. Every detail of the work is explained to the young girls and children as we go along, so they will begin with right habits of work and make it easy for them as we go along. In making the dough I take one pint of flour, one cup of sour milk, one heaping teaspoonful of cream of tartar and one even teaspoon-

ful of soda. One-half of the teaspoonful of soda is for the sour milk and one-half for the cream of tartar. One-half a teaspoonful of soda is enough for a cup of ordinary sour milk. Butter can either be melted and put in or can be used without. I do this work before cutting the apples because they are apt to discolor before they can be used. I use a tablespoonful of butter in making a pint of flour into biscuit. The quantity of butter must depend upon the liquid used for mixing. When we use water we require more shortening than when we use milk.

One of the first lessons in our school is the baking of an apple. The very first lesson of all is building a fire, because no cooking is possible without fire. We find the children are interested and try to cook things at home and report to us their successes or failures. A perfect apple is best baked whole but an imperfect apple is better cored and the place where the core was filled with sugar, or spice or jelly or something of that sort. The children take turns in watching the apples and tending them while baking and thus have a great interest in the work.

This is pastry flour, I prefer it for cooking anything of this sort. The bread flour is better where yeast is used. If I was using the bread flour in this case I would use a scant measure, a smaller quantity. The different amount of liquid depends upon the flour. If we use as much liquid as flour we have a batter; one-half as much, a stiff batter; one-third as much; a soft dough, and one-fourth is for pastry. In putting in the butter it should be softened and not heated hot as it would injure the quality of the baking powder if we used hot butter. The gas escapes much quicker when you pour hot water over it than it does when you pour cold water over it. I will fill the apples for three dumplings with jelly made from apple parings. I then take the apple and place it in the centre of the dough I have rolled out and fold the dough around it and place it in this little cup. I place this in the kettle containing boiling water, taking care that the water only reaches a little more than half way up the sides of the cups.

In making dumplings for stews no shortening is put in because the meat gives sufficient shortening. In stews the water should be rapidly boiling when the dumplings are put in, and should not stop boiling until the dumplings are taken out. We make the dough thinner for a stew and make the dumplings by dropping them from a spoon. I find that there are a great many of our

receipts used as they were years ago simply because they were always done that way. In dumplings for stews I use no shortening and make them a little thinner.

I have made a syrup and will cook some apples whole in that. I will use different kinds of apples and see how they will cook. This is a heavy syrup, twice as much sugar as water. An apple will not break up in it as much as it would in water. This is a good way to make a handsome dish of apples The apples are first peeled and cored and may then be used cut in different shapes or may be used whole. I am very fond of making a pudding sauce of the skins and cores of apples. There are many cases where we should do very well by leaving the skins on the apples unless the skin is very imperfect or very tough. The larger part of my life has been spent in Maine and I know something of the difficulty we have to contend with as to the distance from the markets and I wonder that we don't make more use of the apples that are at our hands in this State.

One thing we cooking schools are accused of is teaching the use of too many utensils. It is certainly desirable to use these utensils for they will make the work so much easier in the kitchen. I am sure one reason why young girls are not willing to stay at home and work at home is because of the lack of proper utensils and because the father does not think the work is worth any pay. If these things were changed perhaps we should have more people living in the country and fewer in the cities. I hope to see that time when there will be in every agricultural experiment station a department for kitchen experiments. I had occasion in preparing for this talk to-night to look a little more into jelly making. I wanted to study it a little more. I looked in all the books I had and found only a few lines in regard to pectin or pectos which is an essential point in jelly making. I went to a lady in Boston who is a well known chemist and told her I had found the terms pectin and pectos used by different writers and had come to her to inquire about it. I thought these terms were used sometimes in one way and sometimes in another and she said perhaps so, because nobody knows much about it yet.

Jelly is the refined product of the apple. It takes considerable apple to make a little jelly. It seems to me it might pay to market apples in this form. I had occasion some time ago to use some jelly that I made some two years ago, and I could not see

that it was any different from jelly made this year. We might do well to study the question a little more although some things we do know we don't quite live up to. We don't seem to realize how much difference little things make. Suppose the apple skins are not used for some time and left to be discolored, then if we should cook them in an iron kettle and don't happen to skim them and then put them in jars that are not perfectly clean we may be sure our jelly would be of an inferior quality and would not keep well. We must be careful of the details of the work.

Whatever may be the name of this substance, whether pectin or pectos and whether both may not be used, it is certain that it is a gummy substance, it is not exactly gum or mucilage but something like it. It would be classed under the same head as starch but still it is not starch. It is that which gives the firmness to our jellies. It seems to be most abundant in fruits before they are ripe and this shows why over ripe fruit makes a syrup rather than a jelly. When apples are used in making jelly if we put an undue amount of water with them when cooking we have a good deal of juice afterward, but it is not so much the juice of the apple as it is the water we have added. It is best to have only enough water to keep the fruit from burning. It is best to use an agate kettle and an agate or wooden spoon in stirring. Apples make the best jelly when they are not fully ripe. The proportion that is best is about one pint of sugar to one pint of juice. We shall have a very sweet jelly if the juice is mostly water that has been put in. The jellies of different kinds of apples will act a little differently. Late in the season we may combine other fruits with the apple. We may improve an inferior apple very much, if we are obliged to use an inferior apple. It is a very convenient fruit to combine with other fruits. It combines well with the quince and with the pine apple and with other fruits. Of course they will not be quite equal to the fresh apple but will be quite good.

*Ques.* In using apple parings should not great care be used in having them perfectly clean?

*Ans.* Certainly, any dark portion should be removed and the apples should be wiped. Sometimes I use the cores with the skins. Sometimes in making apple butter I flavor with almond to make up that little almond flavor which we have in the seeds. Apples may be simply baked and served as a vegetable with meats. Apple stuffing is good for goose.

I have here a tumbler of marmalade This may be shaped into little balls and rolled over in sugar to keep the shape and this could be used to take the place of candy in family use. If they are kept twenty-four hours and then rolled again in the sugar they will be much firmer and better.

There are many methods of preserving fruits, first is the old fashioned method of preserving pound for pound which kept for an indefinite period of time. Then the canned fruits which do not keep well unless the air is excluded. This canning of fruit is comparatively a new thing. As chemists and others are studying bacteria more, we find how very necessary it is for us to be very careful in having our jars heated before we put the fruit in them. It is not enough to simply rinse out the jars and simply scald them, it is better to put them in the oven and give them a good baking in order to kill the germ which may interfere with our canning. It is necessary to keep out the air perfectly. We think old rubbers will do just as well and we don't always think it is necessary that this part of the jar should be as well heated as any part of the jar, so we let a few germs of mould get into the different jars we are putting up.

The great point in making jelly clear is skimming the jelly thoroughly while cooking. It is not necessary to skim it so very many times only be sure the skum is thoroughly removed before it is boiled into the rest. I think the jelly process should be very gradual, I think it should be evaporating rather than boiling. There are many ways of putting sugar into the jelly, and perhaps the best way is to allow the fruit to boil a little while and then add the sugar. In using apples about two-thirds as much sugar as juice is sufficient when care is taken that there is not too much water in the apple juice.

To make a nice beverage for an invalid from apples we may slice them and cover them with boiling water and let it stand for some little time. Then the skin of the apples in this way will give up a large amount of its color and part of its flavor. The bright color will often attract the invalid who is tired of lemonade and all such things as that.

If we want to further flavor these apples we are cooking here, we can put a piece of cinnamon bark in the syrup or any whole spice rather than put the apples into a liquid that has ground spice in it; it would injure their shape a good deal. A very pretty way to use

apples cooked in this way is to make an apple snow by beating the whites of eggs with the apple pulp and use the yolks of the eggs for the custard, the whites for the snow. I use the yolks only of the eggs. Two or three yolks to a pint of milk. If we use six yolks to a quart of milk and the six whites for a cake we use no more than we should if we had used three eggs for the custard and three for cake. In making a custard pie the white is needed; the yolks of the eggs contain more oil and so make a richer, smoother custard, but would not make quite so firm a custard.

These apples I have cooked in the syrup make a very pretty dish simply arranged on a plate and filled with jelly.

From the syrup in which I cooked these apples I will make a sauce for the apple dumplings. I generally add the parings of bright red apples to the syrup to color it but in this case I will put in a little of this jelly made from the parings of apples, as I am in a hurry.

(As fast as the apples were cooked they were passed through the audience to be tasted and inspected.)

Before I close I will make one more dish and that will be a jelly omelet. An omelet is sometimes good for dessert. I am going to make it as a dessert to-night with jelly on it. If you wish you can make in exactly the same way and leave out the jelly and you have a very good omelet for ordinary purposes. The rule is, two eggs, two tablespoonfuls of milk, a very little salt and a teaspoonful of butter and sugar. The whites are beaten to a froth separately, the yolks added afterwards, one teaspoonful of butter and sugar and a little salt. In the ordinary omelet we put in a little pepper and omit the sugar.

## FEEDING APPLES TO STOCK.

By CHARLES E. WHEELER, Chesterville.

In the early part of the present century my great-grandfather in clearing one of the many hillsides of Franklin county set out an orchard of from six to eight acres which in due time came to bearing. In after years this orchard fell to my grandfather and was in its prime near the time I came upon the stage of action.

I recall those days with pleasure. Such loads of golden fruit! The sweet, the pleasant acid, the bitter sweet, the crimson blushes, the bright russets, such as only can be found in a large orchard of seedling trees, for this orchard was never grafted, and its product had to be used in the many ways common to those earlier days. The product of this orchard in some of the years was counted by the hundreds of bushels besides such fruit as was too soft or too early to be advisable to haul a mile where the new home had been erected. Thus you see that my early days were connected with those who must plan to make use themselves of this large amount of fruit, there being at that time little or no market for the same. To do this many bushels were ground at the old mill, certain kinds were put into the cellar for winter use in the family, and evening after evening spent in preparing the apples for drying, amounting, many seasons, to ten or twelve barrels of sliced apples, while other kinds that had proved good keepers, were placed in bins to be fed to the stock during the long winter. And besides all these, out in the old mill and corn barn were bins holding many big ox-loads to be frozen. I recall with vivid pleasure the eager expectancy of the young stock and flocks of sheep as they looked for their daily ration of apples.

Those were boyhood days so full of pleasures and blessed anticipations, perchance many of my hearers can look back upon similar events in their own lives. Times changed and this back farm or "old place" was divided between three brothers, one of which was my father, and I came to know more of the stern realities of work, and work it was, gathering those great trees with their spreading branches. But during the winter I felt well repaid as the stock flourished thereon. About this time an effort was made to engraft the trees, but the dry years of the early seventies and that year so well remembered by Franklin county people as caterpillar year

destroyed a great many of the trees, so that this move profited us nothing, and the orchard has grown less from year to year till now but a vestige of it remains.

But the lessons of those days remain and to those who have seedling trees too old for grafting, I would say, care for the fruit, feed it judiciously, and you will find a profit by so doing.

Let us consider for a few moments the apple from a scientific standpoint, not that I lay any claim to being a man of science, but there are those who are, and they are a class of people whom I have a very kindly feeling for. These experiment station men, what a world of work they are doing for the farmers! What days of doubt and trials they are saving us! We are no longer obliged to grope in uncertainty and doubt as in years that are passed. Not only do they work out these problems for us but they lay upon our tables the results so that he who runs may read and profit thereby. These men tell us that a large amount of the apple is water, but by comparison, we find it contains no more than many other foods. From the third report of the station at Amherst, Massachusetts, we find that R. I Greenings have 84.65 per cent of moisture; sweet apples, 75.17 per cent. Third Ohio report, potatoes, 78.65 per cent; fifth Amherst station report, carrots, 90.02 per cent; skim milk, 91 per cent; corn ensilage, 71.60 per cent. From the Vermont report of 1888, that Harris Globe Mangolds, 94.34 per cent; Brewer's Grains, 78 34 per cent Yet in comparison with other foods we learn that a ton of apples are valued at only sixty cents per ton, with wheat bran such as fed at the Amherst station, $15.42.

This brings us to the point of consideration. The careful painstaking farmer well knows that a ration in which is included apples, beets, carrots or turnips, will put on a finish of flesh to beeves or mutton and to the dairy cow a certain heartiness and grand powers of assimilation so much desired. So to that farmer who has seedling apples, I would say from experience feed them, feed them each day at just such a time in the day and you will prove to yourselves that they are worth many times sixty cents per ton.

To farmers who winter shotes good use can be made of apples and milk, especially can frozen apples thawed in water to which is added some bran or flour be recommended for breeding swine.

Vermont Station in 1888 reports on apple pomace and to those owning mills or living near that the pomace can be obtained

without too much trouble may gather something of advantage from this report which I will read.

It has often been claimed that apple pomace has no feeding value and the practice of almost all the cider mills in throwing away the pomace, shows that this belief in its worthlessness is widespread. Chemical analysis has always said that there was considerable feeding material in pomace, and the station undertook to find out whether this was so. As the pomace from the mill would not keep, it was determined to put it into the silo and see whether by exclusion of air it could be preserved; the result was a perfect success. About six tons of pomace was put into a small silo six feet square, each load was leveled and tramped down firmly, and when the last load was in, the whole was allowed to stand and heat to about 90°; it was then covered and weighted with stones about 50 pounds to the square foot. The heat decreased at once and when the cover was removed a month later the pomace was found in a state of perfect preservation, and remained so during all the weeks that we were feeding it. The milch cows like it exceedingly; when there is any in their mangers, they take it in preference to any other fodder we can give them and eat it all before beginning on hay or corn fodder which was usually given with it. There was no decrease in the milk flow, as has often been claimed to be the result of feeding apple or pomace, and we probably get from it the full feeding value as indicated by chemical analysis. We feed ten pounds a day in two feeds of five pounds each, night and morning. Feeding in this way a cow would eat a ton during the winter season, and there can be no doubt that it would be a good investment for any dairyman to put up for winter as many tons of apple pomace as he has cows.

Now Mr. President and Fellow Workers of the State Pomological Society, you, I doubt not, query in your minds regarding my faith in the assertions presented. I say in all honor to you and the principles of our Society that while they may be true, I wish to take no stock in them. By rights of purchase and inheritance two-thirds of this orchard I have referred to was once mine but I have disposed of it that I could put more time and means into an orchard that I could look forward to as producing fruit suitable for something better than feeding to swine or the golden hoofed sheep. We may in some seasons be *compelled* to dispose of No. 3s by feeding but no thorough-going pomologist can afford to allow a young, thrifty tree to grow fruit fit only for feeding to stock, when the

markets of the world are crying for Maine grown apples. You cannot even afford to feed wormy Baldwins when men are clamoring for canned goods at $2.40 per dozen, and it is a fact that it is wastefulness to even feed the parings when jellies are called for as they are to-day.

Advancement is the word to-day. Gentlemen, if you have an old orchard that is producing seedling fruit, take care of that product, but don't allow a single tree in the orchard, field or pasture, or by the roadside, that is healthy, no matter how scrubby, or how ill its shape. Change it to some profitable variety, and although you may not receive the full income therefrom, some traveller along the road or the children in their strolling through the pasture may eat and think of you with pleasure.

## PLUM GROWING.

By S. D. WILLARD, Geneva, N. Y.

About twenty-five years since, having learned of the success in plum culture which had followed the efforts of those engaged in the work on the Hudson river, it occurred to me that results equally satisfactory might be attained on the good lands in the western part of the state.

With the soil and climate adapted to the work, shipping facilities unsurpassed and a market that readily absorbed all that they produced, at profits far in excess of anything we could ever hope for in apple growing, I found the plum orchard men the happiest fruit growers of the times.

The fruit was picked, dumped into barrels, put aboard of steamers the same day and landed in New York before daylight the following morning, and with no competition, sold at prices which in some cases, netted the shippers from $300 to $500 per acre, per annum.

Are you surprised that an enthusiastic fruit grower should decide without much deliberation that plum growing 150 miles westward on as good land as the state afforded, was to be given a trial?

A recently planted apple orchard, two rods apart, was the only available land, a portion of which was forthwith planted with 300

plum trees, alternating the plums between the apples with the idea that by the time the apples had grown so as to require the entire space, the plums would have exhausted their energies and ended their existence. The plums began to produce a paying crop the fourth year from planting, and with the exception of one or two off years, each succeeding year increased their crops for several years following. They were the admiration of all who saw them, many of whom had ridiculed the idea of growing plums so far from the markets of our great cities. Indeed, they had been pronounced "Willard's Folly," but net returns of ten to twelve dollars per tree was an argument beyond controversy, and an impetus was given to the business that has been followed by the planting of thousands of trees in that vicinity, many of which, from a lack of intelligent care, will never realize anticipated results. The seventh year from planting the Baldwin orchard, set with one year trees, made an average of one barrel to the tree, but $1.50 per barrel made the net returns so insignificant as compared with the plums—while both had been treated with equal liberality in food, made of barnyard manure, wood ashes and bone meal—that I well remember saying to my wife one evening when riding through the orchard, "I am about to dig out those apples and fill up with plums." She plead for the apples, and my confidence in her superior judgment caused deferred action until a few years later, since which time seven-eighths of them have been dug out to make room for those that will give quickest and more profitable returns.

The old plum trees originally planted have been a source of a fine income. Many have died of late and others show the infirmities of age. But other fields have been planted so that several thousand trees are now included in our acreage. I fancy many will say as others have said, "Well, I would never have made fire wood of those beautiful apples just coming into their full vigor," in response to which, I can only say it seemed to me that life was too short and percentage too low to waste it on raising apples with the probabilities all on the side of the plum.

But the question to be treated fairly, should be viewed from all sides. The plum is a capricious fruit, requiring soil, climate and surroundings all congenial, to be profitable in its returns. Liberal food is required of the right sort. An excess of nitrogenous matter is not wanted and may be injurious, while potash and phos-

phoric acid in some form each contribute to its health and productiveness.

It is a subject of disease as much to be dreaded as the small-pox in the human family and equally as contagious. The black knot cannot be trifled with, and whenever and wherever found, should at once be cut out and burned, or the owner will have reason to regret its neglect in seeing the destruction of his orchard.

The Hudson river district is a fair illustration of such neglect. Growers allowed it to get beyond their control before effort was made for its extinction, and to-day, wherever you see a plum tree the black excresence often covers its entire surface. Plum growing is a thing of the past. Those promising orchards are destroyed, and until all are burned and the fields themselves renovated by fire, it would be the height of folly to plant others.

Wherever the plum will grow the black knot may be expected and it must be watched. Perhaps science may yet teach us how to render this valuable fruit impervious to the action of this disease. Experience has shown that it may be quarantined and held in check by the exercise of care at the proper time. Twice every year the orchard should be carefully examined and every vestige of it should be cut and burned.

While an orchardist may thus protect himself from the disease as it may develop on his own premises, he has no insurance as against negligent neighbors on whose trees may be found the black excrescences without number, the spores or seeds of which may be carried by the wind for several miles to find their lodgment on fresh soil to the surprise and dismay of the most diligent and careful cultivator.

We believe that the only protection that can be afforded against this most destructive agent to all growers of the plum, is the enactment and rigid enforcement of a state law that shall make it an offense punishable by imprisonment and a wholesome fine, for any man to allow a tree infested with the disease to be found growing upon his premises, and that commissioners should be appointed in every town at town or county expense, whose business it should be to see that the law is executed to the letter. This for those sections where the cultivation of the plum may be prosecuted in a large way in the commercial orchard.

Another serious drawback to the health and vitality of the plum is the leaf blight, but recent experiments at our experiment sta-

tions have taught that a few sprayings of Bordeaux mixture in the early season will generally provide against the defoliation that follows the work of this form of fungi. A healthy and productive plum tree requires a healthy foliage carried well into the autumn, and only such a tree can be depended upon to give the most profitable returns.

The curculio, the insect so destructive in its depredations upon all stone fruits is exceedingly fond of the plum, and as a rule, selects the choicest sorts on which to do its work. It begins its work upon the dropping of the bloom, especially if the weather is warm, but a daily jarring of the trees at this time upon sheets prepared for this purpose and a destruction of the bugs as caught for two weeks, will usually insure the crop from further trouble in this regard. Various plans there are to accomplish the same end. We have found the bugging machine, as it is styled, to answer our purpose well, and quite economical in its work. Others spray with arsenical poisons, while many question its utility and fear damage that may follow their use upon the foliage.

We will next touch upon varieties that we have found most valuable in the commercial orchard. In this, hardiness, productiveness, and market demands, are the factors to be considered rather than those qualities that satisfy the taste of an epicure to eat from the hand. Very few of the plums produced are used except for preserving in one form or another, hence, we argue in favor of those sorts of known value for these purposes, combining the first named conditions with a disposition to best resist prevailing disease heretofore referred to

The Reine Claude de Bavay is without question the most profitable of all plums, and but for its tenderness, it would head the list for poprlarity. But in the most favored districts of the Atlantic states it is at best but short lived. The Lombard, well known and exceedingly productive, is everybody's plum, and with its great freedom from the work of the curculio, is justly entitled to its popularity. But as every one raises it, and the season of ripening so often brings it in competition with the glut of Southern peaches, we have thought it desirable to grow it only in a moderate way and push to the front sorts both earlier and later in maturing, which would command the markets for the longest possible period in the fruit season. Hence, we commend the Field, ripening ten days in advance of the Bradshaw, followed by Bradshaw, Guii, French

Damson, Hudson River Purple Egg, Coe's Golden Drop, Italian Prune, Stanton, and Monarch as embracing a list large enough and covering varieties worthy of trial for test purposes for any one desirous of embarking in the business.

Others could be added of nearly equal value, but these out of fifty varieties now being fruited have been selected, while many more have been discarded for lack of sufficient productiveness, weakness in constitution or other causes that unfitted them for continued cultivation. Some of them were imported from England and France, while some others imported at the same time here served to swell the number of those of no value in the commercial orchard.

Please bear in mind that, as a rule, the light colored sorts are the most tender, hence, when hardiness is an essential factor, we should say plant largely of those of dark color.

Many sorts can be grown with best results by top grafting or budding on other sorts. Plant Lombards and work over the second year. This method we advise best for both Reine Claude, Coe's Golden and French Damson.

So far, reference has been had to only European varieties, or those known as such or their seedlings. There is, however, a class of plums now attracting attention over a wide spread section of our country that seem to have a foliage so thick and rugged as to be able to resist the attack of all forms of fungi, and fruit buds that will resist winter's cold to 20° below zero with productiveness unsurpassed by any of the old European sorts. I refer to the Japan plums of which already quite a large family has been introduced which are being tested quite generally from the Pacific to the Atlantic, but as the name Botan—which, as I understand, is the name applied to one family in Japan, of which there are many differing more or less in some respects—has been attached to many as they have been disseminated in this country, I apprehend that much trouble will follow the question of nomenclature.

At the suggestion of a friend in the Department of Agriculture at Washington, I obtained the Burbank, which, so far, has shown itself to be the most hardy and productive of all, and where there may be dangers from spring frost doing damage to early opening buds I should commend this in preference to any of the others so far tested, as it is later in unfolding and opening its protection to the fruit germs. We have had branches of this variety that

matured one hundred perfect plums to the square foot, size, medium; color, beautiful; light purple on a yellow ground work, ripening from first to tenth of September. In point of quality nothing equals or surpasses the Yellow Japan, which ripens from one to two weeks earlier, is larger, but I fear may not be quite so hardy, but in general color and beauty excel them all. Another received under the name of Botan, and which we labeled No. 26 to avoid confusion, while the poorest of all in quality ripens about July 15th, and being so early, productive, and very hardy, seems to be finding its way into favor with no effort to push it, and may be regarded as having value in sections where hardiness is essential. As it seems impossible to trace its origin save from an importation of scions that came in from San Francisco several years since from Japan, one of my friends who has been interested in its dissemination, has seen fit to name it the "Willard Plum."

The terms hardiness, however, as applied to the plums we raise, is so little understood that a word in this connection may not be out of place. My observation and experience has taught me that a variety pronounced hardy in ordinary seasons and carrying its fruit buds safely through 20° below zero weather, if by the work of fungi or other causes, is defoliated early, so that its wood fails to be properly matured will show extreme tenderness and suffer in a mild winter so as to fail of a crop the following season, and this feature, if carefully watched and understood, will often account for the varied reports often had as to hardiness, or lack of same, on the same variety grown in different sections and under different circumstances, and suggests the idea whether or no the judicious application of proper plant food at regular periods may not aid materially in the development of such a growth as is needed to produce those essential conditions required to make what we denominate as hardy trees. I am in receipt of scores of letters annually, inquiring if I think plums may be successfully grown on their soil or in their latitude. If south of New York city I invariably say very doubtful, but if in latitude forty-four or a little south or north with other required conditions, the probabilities are in your favor. As to soil, if provided with the proper elements, it seems to make but little difference whether composed of the heavy loam of Western New York or the light sands of Michigan found on the eastern shores of that great lake. Some of the finest crops I have ever seen produced have been grown on those light soils, and hundreds

of acres are being planted annually to find their market directly across the lake in the cities of Milwaukee and Chicago. These lands, however, have been but recently reclaimed from their original forest growth of pine and maple and are rich in all elements of plant life.

### PLANT FOOD IS PLANT LIFE.

We have ever believed in the most liberal feeding possible for all fruits that are produced, but we believe this often requires the exercise of greater intelligence than is possessed by the average farmer, and we rejoice that our experiment stations are affording information and aid that is enabling the fruit grower to apply science to his work as never before.

We for years labored under the impression that the more barn-yard manure we could give our plum trees the better. It was a mistake, too much nitrogen and too great a growth of immature wood with a corresponding growth of fungi as the result. Latterly we have ascertained that potash and phosphoric acid give us a harder, better wood, more rugged foliage and fruit buds better fitted to produce a heavy crop of fruit. Wood ashes alone are very valuable, and if called upon to decide the question as between wood ashes and barn-yard manure, we should certainly take the ashes. The question is often asked me, when would you apply them and in what quantities? I should say at any time when we had leisure, and all that we can get money to pay for.

### PRUNING.

Judicious pruning and thorough thinning of the fruit are each important factors of the work we have in hand, and neither can be ignored except at an incalculable loss in the future of our orchards. "Train up a child in the way he should go" comes in with equal force when applied to the growing young plum orchard.

Beginning with the second year after planting, the young orchard should be looked over carefully annually, and the previous year's growth should be cut in, removing from one-fourth to one-half of such growth, thus forming a strong compact head and the development of the fruit spurs near the body of the tree, where the future crop may be carried with safety against violent storms and lessening the liability of the limbs being broken and split into pieces.

It should be borne in mind that the wood of the plum lacks the tension which is found in the apple and pear, hence, will not stand

equal strain. Nor can any lack of care at an early period of growth, touching this question, be met and overcome by efforts in after years when "the saw" must be substituted for the knife in an effort to make good lost opportunities. Orchards there are where this principle has been practiced with heads as round and symmetrical as the most beautiful formed horse chestnut you ever saw. The work should be carefully followed any time after the tree becomes dormant in the autumn, and through the winter when the tree is not filled with frost.

### THINNING OF THE FRUIT.

A subject of no less importance, ofttimes involving the health and even vitality of the tree itself, is the proper thinning of the fruit. The average quality rarely sells at any thing over average prices, while the large, well developed specimens only, bring the high prices that afford the largest profits, and such fruit is not found on trees over loaded beyond their power to properly mature.

In every department of nature the effort of reproduction so taxes vital forces as to make it a weakening process, and in none of our fruits is this more manifest than in the plum which is often so depleted from a single year's over production as to never recover from the injury inflicted. It is not the fruit itself, but the draft upon the energies of the plant to perfect the pit, that reduces its vital powers, and often leads to premature death, hence, we say, after the dropping which usually follows the setting of a large crop, the wise plum grower will often find it an advantage to have removed one-half of that remaining, and as a result, the marketable crop increased, quality greatly improved, and trees with their vigor unimpaired to at once begin to store up the necessary material for another crop. A lack of the exercise of a little common sense in this regard on the part of many a man has destroyed more plum trees than the damage ever inflicted by the curculio, indeed, it has often been a grave question in my mind whether the work of this insect might not after all be a blessing in disguise.

So closely connected with the question of thinning is the time of picking that the two should be considered together. Unlike the apple, pear or peach, the fruit of the plum is very seldom purchased for eating from the hand, indeed, the varieties that have any value for this purpose are exceeding rare, especially when considered in the light of those that may be profitably produced in

the commercial orchard, therefore, we say, at the earliest practicable moment after fully grown and colored, while yet quite hard, pick and dispose of, even though a week later, might show a material advancement in prices. They will ripen to a certain extent after being picked, and at this stage of ripeness they meet the requirements of the purchaser, will stand up well for distant shipment, and relief is afforded to the tree which at once begins to store away its supplies, to restore exhausted nature and equip itself for another crop.

Prices are quite apt to advance later in the season, and the temptation to allow the fruit of sorts not inclined to decay to stand on for a week or two, is hard to resist.

Ten pound baskets that have been selling at seventy-five to eighty cents have advanced to $1.25, and finally to $1.50. One of my friends with a crop unthinned and double in quantity what the trees should have been burdened with, had this question to meet a few years since. He allowed them to stand, until finally he picked them from the ground and $1.50 per basket. A severe winter followed, and with little power of recuperation left, many of the trees the following spring were gone, while others have not regained their lost power. An object lesson worth remembering.

We believe that our fruit should be carefully picked in baskets provided for that purpose, carted or removed to the packing house, and if the weather be hot, allowed to stand until cool, or if possible, picked only in the morning and late in the afternoon, so that when packed for shipment no heat may be found in the fruit, and that the best results will be found in the observance of these rules, the fruit should be carefully sorted, packing and marking all inferior fruit as No. 2.

We believe that the best results in fruit growing are often obtained by growing a variety of fruits, hence, we should say, if practicable, in connection with plums grow more or less of small fruits—sour cherries and pears, but in any event, plant more than a single variety of whatever you may plant and so alternate varieties that you may be sure of cross fertilization or perfect pollenation of your bloom. Our highest authorities on this subject to-day urge it as one of the most important measures to be considered.

CULTIVATION.

The subject of cultivation is one of such importance to the plum grower as to deserve serious attention before we close this already too lengthy paper. Plums cannot be profitably grown in grass, nor do we believe that weeds should be permitted to devour the elements of fertility that have been so wisely and liberally bestowed upon our orchards. But please do not forget that thorough cultivation does not by any means imply the deep two horse plowing that is often bestowed upon the apple and pear. The plum, unlike those two fruits, is a surface rooting tree, and may be seriously injured by destroying its roots which extend in every direction much further than the casual observer would at first suppose.

By thorough cultivation we do mean, keeping the soil as thoroughly stirred as is possible during the process of fruit making so as to destroy all weeds and aid in rendering available every particle of plant food for the growing crop, but at the same time, doing this by the most shallow culture possible. We have found a light gang plow and spring tooth harrow, two very serviceable and economical instruments in obtaining this end.

Much more there is that might be said on various points pertinent to the subject, but I will close by simply saying, I believe thoroughly in plum growing as a profitable venture where plum trees will grow and thrive, but only on good dry land. And now thanking you for your kind attention, I should be only too glad to answer any questions that may have come to the mind of any person present.

DISCUSSION.

*Ques.* Wouldn't a spring tooth harrow do without the plow?

*Ans.* That would depend upon the soil. Our soil is quite a tenacious soil. Sometimes year after year where land is cultivated and has not been seeded, many weeds have appeared. We would say the gang plow is sufficient on these things but the spring tooth harrow has cut off these weeds.

*Ques.* What do you think of the Quackenbos?

*Ans.* The Quackenbos is a large plum exceedingly hard, but I was sold more on this than on any plum. In the first place, we didn't make money enough after I planted 1000 at one time. I had a pretty fair crop after girdling the trees. I have never been successful since then.

*Ques.* Have you tried Moore's Arctic?

*Ans.* I speak from my standpoint: it is very defective in foliage with us. The quality is exceedingly low and it is sort of a dead color and most of the ladies want fruit for culinary purposes that is very attractive. Chase and I were looking over Moore's Arctic and he said, "I am just disgusted with that. I have been talking and selling it all over the country and it is not worth anything. We have got to cater to the wants of the people."

*Ques.* How near to the trees do you run the gang plow.

*Ans.* I don't run the gang plow very near to the trees, about five feet. Run the harrow nearer. We cultivate both ways with the harrow and only one way with the gang plow.

*Ques.* How far apart do you set your trees?

*Ans.* About sixteen feet apart one way, and the other way you may have them closer if you wish. You have got to have them so that you can run your bug machine through. That bug machine is so constructed that you can run it between rows sixteen feet apart. Some varieties grow very upright and don't need so much room. We have some that are not more than eight feet apart, they are the upright varieties, but I would not advise that, for where you do you have to do high feeding. The Quackenbos takes up as much room as the apple and it is good for nothing.

*Ques.* Are you troubled with black knot?

*Ans.* In relation to the black knot, I have studied it quite a little. It has always puzzled me how it is that it goes right to the heart. You take one just started and you will find it reaches to the heart of the tree. If it is a fungus how is it that it eats to the heart of the tree? It is very much like a cancer, in its nature, it is death.

*Ques.* Is it impossible to restore trees after once attacked by black knot?

*Ans.* Not at all.

Prof. MUNSON: This black knot grows within the tissues of the wood. The part we see is the fruiting portion of the fungus, the plant itself is simply a plant growing within the other plant, the plant itself is within the tissue.

Mr. WILLARD: I find in cutting it out that if you will watch it closely you will find that these little threads run down. We have found that a little kerosene is very effective. I can do these things but I would not give that as advice to others. I won't allow the boys to use the kerosene, I want to do that myself, it wants to be

used with a feather and applied very judiciously. We don't like to have it run around the trees, but I want it to penetrate as far as the threads go.

*Ques.* What is your method of engrafting?

*Ans.* There are two or three methods of engrafting. I cut my scions before cold weather, then I put them in the icehouse where the sap will be perfectly dormant, then as early as the sap flows in the spring I engraft. I have two methods. If you understand budding I can explain about one of them. (Here he explained and illustrated grafting in relation to budding.) This method I got from some plants that were imported from France and I thought if it was good for a Frenchman, it was good for an American. The great thing in plum grafting is having the buds perfectly dormant. All of your seed fruits graft more easily than stone fruits.

*Ques.* Do you have green lice on your trees?

*Ans.* Oh yes. We treat them to a good spraying of whale oil soap and tobacco. It is the best thing I know of.

*Ques.* Doesn't the whale oil soap injure the foliage?

*Ans.* Not at all. I can't tell the quantity used because I leave that to the farmers. The tobacco water is better than the whale oil soap, but the whale oil soap in a good strong suds will make the tobacco adhere.

*Ques.* Is your method of applying bone meal and ashes entirely on the surface?

*Ans.* Entirely on the surface.

*Ques.* What proportion of bone and ashes do you use?

*Ans* We take them and put them on by the handful. We don't mix them. It makes a little difference as to the fineness of the bone meal. If it is pretty fine put on four handfuls. We use very largely of wood ashes and potash.

I referred to a bug machine very frequently in the paper which I read this morning. The machine is used especially for catching and destroying the curculio which makes such havoc with all our stone fruits. The curculio is the worst thing that the plum grower has to contend with. We used to use sheets stretched on bars but we found after a time that it took a man and a boy to run these sheets. A man would carry one end, the boy the other, they would surround the tree and the man would jar the tree with a sort of a crutch arrangement and the concussion caused the curculio to drop off and then they picked them up and crushed them between the

thumb and finger. Anyone who knows this bug, knows that he plays possum and curls up to look like the bud of the tree. We found it cost us on an average of twenty-five cents a tree to do the bugging and I thought we must employ some cheaper method. So one of our mechanics went to work and arranged a machine something like an inverted umbrella. The inverted umbrella is placed upon something like a wheelbarrow. The arms extend on either side. A man pushes it along, it is perhaps ten feet in length and is arranged upon low wheels of the diameter of perhaps two feet so that the machine can be pushed against the side of the tree. There is a slit cut in one side of the umbrella so you can push it against the tree and the tree comes to the apex or where the staff would be in an umbrella. Then as you jar the leaves of the tree the bugs drop and go on the sheet. Just at the apex of the umbrella there is a little tin drawer into which the man brushes the bugs that have fallen into the umbrella and so he goes through all the trees. At the end of the row there is a peanut roaster where he empties the contents of the tin can. That is the machine and it costs us about ten cents per tree if a good man works as he ought to work. With that machine the work is done quite as thoroughly as you could do it with sheets or any other method. We go over them right along every day, we skip Sundays, the bugs keep at work, Mondays they are pretty thick, we have to go over them at least twice Mondays. We follow that up for a week or ten days and then we do it every other day. About the third week you would not find many of them. That is about the modus operandi of running that machine and catching the bugs. In the morning they are more dormant, they are not so active as they are at noon. The curculio is a rascally fellow. They will deposit an egg in one plum and then go right to another plum and so they will destroy these plums as rapidly as I can talk.

## DISCUSSION—THE ORCHARD.

Mr. POPE.—You may call me selfish because I don't advise men to go into this business. A man comes in here and hears stories, hears big stories about big crops that we get, and goes out and sets out a big orchard and then cannot wait for his crops. I have only induced that man to waste his money, it is a foolish outlay. It is only those who are willing to make a hobby of it that are going to succeed. I believe in hobbies and specialists. It requires more

nerve than seven-eighths of the men have to be willing to wait. We can't expect in this State as they do in Western New York, to get returns in four years. Perhaps their soil is naturally a little richer than ours. We cannot expect to get much return for ten or twelve years. A man must be a good deal in love with his business to be willing to wait ten or twelve years for his returns.

There are one or two things which I think will be brought up by others in their papers. That is the packing and sorting fruit for the market. I come in here and tell you such apples as I brought here sold for $4.50 in Boston a little while ago. I brought here Talman Sweets, packed as they should be, sold for $4.50 in Boston a little while ago. I sold my Gravensteins for $5.00 and my neighbor his Kings for $6.00. You all want to go into that, there is money in it. Perhaps my neighbor will say that his apples are just as good as mine and he will get only half the money. It is the sorting and the packing. Putting only No. 1 apples in No. 1 barrels, and No. 1 all the way through. I think Mr. Brown and Mr. True will take up this topic and I will leave this matter to them.

Mr. H. W. Brown: The topic which I shall introduce has been brought up in all our meetings, and has been argued on ever since I belonged to the Society; still it is one that every farmer in the State of Maine should be interested in. In my own business, I have been, in the apple season, in the Boston market. I have been so situated that I could overlook the market closely. I have been on the market for the past month nearly every day, and when I saw a lot of fruit from the State of Maine or anywhere else that I wanted to overhaul I did it. I had that privilege given me.

Some apples were sent to a friend of mine. The man who headed up the barrel was afraid he was going to bruise them when he put the head in, consequently there was not a perfect apple in the barrel. That is the way a great many apples are packed. I see very few apples in the market that are packed as they should be. As I was going by the apples in the market. I saw apples from our friend Mr. Staples, and they were packed perfectly and I knew them as soon as I saw them.

Boston market wants a fine apple and they are willing to pay for it. Such a year as last year it would be better to throw away No. 2 than send them to the Boston market. They will not pay for marketing them. If you ship straight No. 1 you will get a fair price for your fruit.

I went on the market a few days ago to buy a barrel of apples for a friend. He wanted me to go with him and select them. I said to the commission merchant that I knew, "Is that a good barrel of apples, is it all right all the way through?" He said, "You ought to know, they came from Maine." He ought to have been able to say, "Yes, that barrel of apples is a good barrel of apples, they came from Maine."

A FRUIT GROWER: I think Mr. Brown is a little hard on some of our fruit growers and I want to say a word for them. He accuses us of some hard practices. I think it is a good deal overdrawn. I don't think that there are so many dishonest ones as he would like to make out. I want to put some of the blame where it belongs, on the apple packers. A great number of the apples in this State are sorted by the men that come here to buy, and I have yet to see a buyer who sorts apples as they should be to put into the local market. They think they can make more money by putting a few choice ones on the bottom and a few on the top, and perhaps that will do for shipment. I want to lay part of the blame where it belongs.

Mr. BROWN: I urge you to pack your own apples and not let the buyer pack the apples. Nine-tenths of the buyers want to pack their own apples because they say that there are so many who don't understand it, particularly the shaking in and pressing in. I think a good many orchardists have a good deal to learn in packing and sorting, that they won't get from the buyers.

Prof. MUNSON: The one point which Mr. Brown urges upon us in marketing is the desirability of those who grow fine fruit to search out the fancy markets. There is a field here which comparatively few will enter, and it is the field which is the most profitable one in the line of orchard culture. One man in New York state, George T. Powell, is in the habit of sending pears right to the home of pears, in Belgium, and outselling the growers there. He gets more out of his pears by sending them to Europe than the growers in Belgium can make. Now it occurs to me, that with some of our very finest fruit, we can wrap each fruit in paper and sell in crates rather than in barrels, and sell to some of the fancy dealers or to the leading hotels. If you have fine fruit you can easily get a contract with some of the leading houses, and in this way making more money than by selling to the commission merchants of Boston. That, it seems to me, is where we must look

for an outlet to our finest fruit and where we must look for the greatest profit on our finest varieties. Of course that would not do with all varieties, we could only do so with the finest.

*Ques.* What sort of a barrel is best?

*Ans.* Most fruit men would rather have good, clean flour barrels for apple barrels than any other kind. Fill your barrel one-third full and shake it down and fill up two or three times and put a peck on top, and press in the head. Of course it bruises a few on top. if you have large ones on the top and small ones in the centre they will say that barrel will not run that way all through. Even if you have to make two classes of No. 1's, the largest size and another size, don't put them in together. For you can make a barrel of the largest size and call them fancy apples. Head them up and press the head in and mark the other end of the barrel. It is well to put a paper on both ends of the barrel Mr. Pope has a head made of paper stuffed with excelsior I think, which protects the apples.

Mr. Pope: The cracker barrels come with pasteboard tops and the apple packers in our portion of the State use them for laying over the bottom of the barrel, then place the apples in and place one over the apples before you put the head in I have been making a head of pasteboard covered with one-half inch of excelsior and putting one in for the bottom facing and then putting one on the top which prevents a great deal of this bruising and the Boston commission men said it was just the thing. If you are going to get $5 00 or $7.00 per barrel instead of $2.00, it will pay you to take considerable pains. You can make these at home and if you are going to get $1.00 or $1 50 per barrel more you can afford to take the pains. I think a peck is a little too many to put on top, there is such a thing as pressing them in too hard.

Mr. Knowlton: It is a curious fact to me that you may go through our own State, I don't know how it is here because I have had no opportunity of going to the stores here with respect to it, but almost everywhere in Maine you go into our retail stores you cannot find good dessert apples. If you find apples at all they are very likely to be of the kind Miss Barrows described, heaped into a barrel, all sorts, not very good ones, twos and threes together and perhaps two or three different varieties. Now it seems to me that it would be wise for us as fruit growers and fruit sellers to practice here at home some of the doctrines we preach, with refer-

ence to the apple abroad. That is, we should educate ourselves and the people who buy apples here up to the fact that there is a difference between a strictly No. 1 and a No. 2 or a No. 3 apple.

Another man around the corner who has insisted on selling apples at a good price and get good ones, has had his stand pretty well covered. He had taken pains in getting nice apples. He succeeded in getting a bushel of Fameuse, and I was interested in seeing how people went along and picked off these apples. Then he wanted some more and he could not get good ones in Farmington nor anywhere around there. He was in Boston and he saw some Nova Scotia Gravensteins. They took his eye and he bought a barrel of them and paid $4.50 for them in Boston and thirty-five cents for freight to get them to Farmington, which made $4.85 for the apples. My county will sell to go to Boston several thousand barrels of apples, yet that man cannot now get good apples anywhere around. It seems to me we ought to look out for our home markets In order to do that we want to understand the difference between a dessert apple and a cooking apple, and order only apples for dessert that are good for dessert, and then when we apply the principles enunciated by my friend, Mr. Brown, we are going to find a good and steady market in the cities for our apples, and the time will come I think, and I don't believe it is a great way off, when we shall pack apples for dessert use; and pack apples also for culinary purposes. There will be two kinds. The dessert apple will be the best there is, it will be a No. 1 apple; the cooking apple will be a No. 2; there will be a difference between them, so that when one sends to market and wants a good dessert apple he will find it in a different package than the cooking apple.

Mr. WILLARD: I was very much interested in the talk you had in regard to packing fruit. I think the medium sized fruit sells better when packed by itself. There is a great deal in sorting them over carefully. If you have any defective fruit, pack it and mark it No. 2 and let it go on its merit. There is this thing that is true. We can always get a great deal more money proportionately out of our No. 2 fruit than from our No. 1. We never have quinces so poor but what we can sell them.

## SPRAYING AND ITS RESULTS.

By Prof. W. M. Munson, State College.

The one great drawback to fruit culture in many sections of the State is the trouble from disease and insect attacks. And some of you know that I am getting to be quite a crank on that subject. For two or three years, as a part of my duties in connection with the experiment station, I have been undertaking to combat the disease causing scab on apples. The difficulty is you take such an apple as that, for instance that has only one spot on it, and put it in the cellar and keep it till February, you are likely to have a fruit something like that (showing a badly diseased apple.) The point is that apples which are attacked by this apple scab fungus will not keep as well as perfect fruit. The scab will develop in the barrel. This defect is caused by a fungus whose spores are distributed by the wind and we have no means of controlling it, except in individual orchards. As the result of the work of several experiment stations we have a means of controlling this growth. For several years we have been conducting experiments in this line, and I will first call your attention to the results of the experiments of the present season which was not a very bad season as it was quite dry, and during such times the scab does not develop as in wet seasons. The case taken for comparison was from Mr. Pope's orchard. (He here used a chart showing the different mixtures used, and the effect of each.)

Another mixture called the Bordeaux mixture because it was first used in Bordeaux, France, we find the best mixture which we have used. The solution is very much modified from what was given a few years ago. Six pounds sulphate of copper, four pounds quicklime and fifty gallons of water. It is highly important that this sulphate of copper be dissolved in a wooden vessel. If it is dissolved in an iron vessel or a tin one, it will corrode it. It has been a question whether Paris green might not be a preventive of apple scab Paris green, as you may know, is arsenite of copper. We thought that it might prevent the scab and so we added the Paris green in one case to the Bordeaux mixture, but we found no benefit from the use of this double mixture.

This table shows the result during the present year, and this table shows the results obtained during three years, 1891, 1892 and

1893. You will notice the last year was a very hard year on our fruits. This year it was much better. I have some photographs here, one tree was sprayed with Bordeaux mixture and one was not. When the fruit was gathered I photographed them. This one shows the perfect fruit at the left, the fruit badly scabbed in the centre and that which was somewhat scabbed at the right. The other picture is of a similar lot which was not sprayed.

I said over to Winthrop the other day, "I am willing to put myself on record as stating that apple scab may to a large extent be checked by the use of some solution of copper, and the best of those solutions seems to be the Bordeaux mixture."

*Ques.* A man in our town raised some very fine Talman Sweets. In years past I have noticed a rusty appearance on these apples. He claimed that it was rather an advantage to his apples, it showed it was of a better variety, but in coming down here I detected that on his Northern Spies there was the same color. Is it some fungous growth or is it not? You may take the apple home if you don't wish to say here.

*Ans.* It does not appear to be caused by any fungus, it is certainly not the apple scab.

*Ques.* I would like to ask if this scab will spread in the cellar?

*Ans.* I have not carried on experiments which would enable me to answer that definitely. It is probable that it might. It is certain that the disease grows very much after it is put into the barrel.

In regard to insects. The insect that the gentleman referred to is the canker worm which gives serious trouble in many sections of the State already. The best remedy which I know to meet this is spraying with Paris green early in the season, using about a pound to 150 gallons of water. Pretty strong. Brother Pope had a little experience in spraying with Paris green for this insect last season. The remedy that is used in some localities is to tie tarred paper around the trees to prevent them from crawling up. The female moth has no wings so crawls up the sides of the tree. If we put bands of tarred paper around the tree she goes up to them but can go no farther. I treated some trees in this way last year. Some of the people here ridiculed the idea but when the season was advanced and there was no trouble with the canker worm they said "Your petticoats did prevent the canker worm after all." So it does sometimes keep them from climbing up.

The codling moth is one of the worst insects we have to deal with. That is very much checked by the use of Paris green sprayed

about two weeks after the blossoms fall. I have been often asked the question whether it was safe to eat fruit which had just been sprayed with Paris green. I may answer definitely, yes. I undertook to prove that last year. I dipped same fruit in Bordeaux mixture. this Bordeaux mixture had one pound of Paris green to 150 gallons of water, and in the fall these were taken to a chemist and analyzed and the chemist reported not a trace of arsenic. So I state there is no danger in eating apples which were sprayed early in the season with Paris green.

*Ques.* Is there any danger in the sheep eating the grass under the trees, having sheep running in the pasture?

*Ans.* I told Mr. Pope if it didn't kill his whole flock I would pay for the sheep it injured. It is certain that his sheep went around under the trees after spraying to get the wet grass and they are all living yet.

Mr. POPE: Wherever we are using this poison we cannot use too much care. You should be very careful in having it about the buildings. There is no more danger, of course, than when you used it on your potatoes. In spraying for scab and the codling moth it requires a little care. The wind may change and blow the fine spray in your face. Once our men got badly poisoned by breathing the wet air. We take precaution now to tie a sponge over the mouth and nose whenever we are spraying with Paris green.

Mr. MUNSON: There is one point that should be mentioned, we should have the spray as fine as possible, a very fine mist rather than coarse drops. The best nozzle for this purpose is that manufactured by John McGowen, N. Y. It is a new nozzle called the McGowen nozzle and is the best one there is up to date. A simple sprayer will do very well but I should not recommend it as it is too small to do much good. If I had only a few trees I would use a little pump called the Little Gem. It is a very convenient little machine costing about $3.50. The machine that has been sold to some extent is the Lewis combination syringe and force-pump. Really that is not suitable. I would not advise anyone here to buy it as it is not suitable as a force-pump.

*Ques.* There is a worm known as the wire worm which is doing more damage than the codling moth?

*Ans.* It is the tripeta pomonella. So far as we know at the present time, there is no remedy for this insect. The best thing to do is to gather and destroy all fruit in the orchard as it falls and be

careful that no fruit from any other orchard is left to decay in that vicinity. It is a very good practice to have hogs and sheep in the orchard to eat the fallen fruit. So far as I know that is the only remedy that produces anything like satisfactory results. As you know, the fly which is the parent of this worm punches the skin and inserts the egg under the skin of the fruit. As the fly does not eat the foliage, we cannot deal with it in that way and there is no way of reaching the insect as yet.

## SMALL FRUITS.

By S. D. Willard.

I have raised a lot of red raspberries and had them shipped to Portland and had them go through all in good order. But we found we had to pick pretty hard if there happened to come a wet day. It is no use sending them to Boston if the berries are overripe, they will throw them into the river. We lost a great deal and I made up my mind that a man to raise red raspberries must live near a canning factory and pick the berries Saturday and let them have them and work them up sometime between that and Monday. We finally abandoned the red raspberry and took the blackberry. We had complaint that the globules would turn red, and we finally concluded they were too perishable, and I said we will try the gooseberry and the currant. We tried the Houghton gooseberry, they are as small as the end on my finger, the young ones didn't like to pick them and were going to strike and all that, so we got the English berries. We were very successful in raising these for some time. We took about $800 in one year in these English gooseberries. Everybody thought we could not raise them and I said, "Now look at them." I never thought the mildew would take me as it did other people. The first I knew the black mildew began to show itself, and it spread here and there. It was bad business. I bought a barrel of sulphur, and said, "Boys, put it on so it will smell." We put it on so thick that you could smell it out on the road. We experimented with one thing and another; and finally, this last year, we have been using the Bordeaux mixture from the experiment station where they have 230 varieties of the English gooseberries. They were very successful in the use of the Bordeaux mixture. The best gooseberry is the White Smith.

You have not quite as dry a climate as we have in New York, and you may succeed with the English berry, but the best of all gooseberries is the White Smith.

CURRANTS.

I don't believe in putting my eggs all in one basket. We take plums first. Plums are the leading thing. But we don't always get all the plums we expect to. So I say it is not a good plan to put your eggs all in one basket. If we fail on one thing, we want something to live on.

The currant crop is a good crop. I think you can make three or four hundred dollars an acre if you can get good currants. There is a difference in the currants you have on your table. Some currants are too acid; one doesn't want it all acid. The Cherry currant and the Fay are to my mind too bitter. I discriminate between what I would use on my own table and what I would sell to the dealer. If I wanted to make money I would give them the Prince Albert, they are the sourest thing in the place of a currant; they make good currant jelly. My wife wants a white currant jelly just colored with a little red raspberry juice. She says that makes the best kind of jelly, and she won't have any other.

If you want a very choice table currant take the White Imperial; if you want a choice red currant the Moore's Ruby and Pres. Wilder. I am almost ready to discard the Fay currant, there is no money in it. Moore's Ruby and Pres. Wilder are very prolific and will hang longer without wasting on the bush than any other currant. I prefer them as a red currant for table use and the White Imperial for a white currant. The Victoria is a grand good thing for market purposes. A fellow in Nova Scotia showed me the finest crop I ever saw. He said he made a clean $500 on one acre of Victorias. He told me how he handled them. He told me a little trick of the trade I didn't know anything about. I said "How do you handle these currants, you have got a beautiful crop?" "Do you cut them in?" "Yes, I cut them in." "When?" "Every winter." "How much do you cut off?" "One-half the growth of wood." "Anything more?" "Yes" "What is it?" "After they get started to grow in the summer season I pinch the new shoots." "That is a new thing, I don't like that." This Victoria is a good market currant but I don't think much of it as a table currant, but if you want to ship a currant to Chicago or Milwaukee you can do so with this.

## THE HOME PLACE.

By Prof. W. M. MUNSON, State College, Orono.

The home environment of our young people during the first fifteen years of life exerts a powerful influence on their future prospects. Mere sentiment will not keep the boys and girls at home. It is our duty as progressive men to proclaim in a practical manner that home life may be made attractive on the farm. It is purposed at this time to touch upon a few of the more salient points that present themselves both in making a new home and in improving the external conditions of the old.

### SELECTION OF SITE.

Consider well the location of the house. Do not build a new house where the old one was simply because the barns are there, though, other things being equal, the barns should be near the house, for convenience is an important factor in the value of a farm. Healthfulness is of the first importance. Hence be sure that the location of the residence is such that perfect drainage, both soil and atmospheric, is secured. Other things being equal a southern or southeastern aspect is preferable. Make use of natural groves or scattering trees. Nothing you can plant will ever be so satisfactory as the natural forest trees. The protection of a natural shelter or windbreak is also to be considered. It takes many years to provide suitable shelter.

### WALKS AND DRIVES.

It is just as easy to drive in the same place every time, to have clearly defined drives, as it is to go all over the yard. In general place a walk or a drive wherever needed, but think twice before deciding. All walks and drives should be direct. The drive for heavy teaming should lead directly to the barns and should not go nearer the house than necessary.

### DRAINAGE.

The importance of good drainage for sanitary purposes and in the production of ordinary farm crops is fully recognized. But we sometimes forget that trees and grass are similar to other

plants in their requirements. Even willows do better on well drained soils than when surrounded by stagnant water. The difference between well drained and undrained soils often determines whether a plant is hardy in any given locality.

### THE LAWN.

A good lawn is the most essential element of beauty in any grounds, and in these days of cheap lawn mowers there is really no excuse for not having a neat lawn in front of the humblest dwelling. It is very little more work to leave the surface of the ground smooth after the final grading about the buildings than it is to leave it rough and uneven. Arrange if possible to have a few inches of loam on the surface when the grading is completed.

The best grasses for a lawn are Kentucky Blue Grass, Rhode Island Bent, and Red Top, with a slight admixture of white clover on heavy soils. Give thorough preparation to the soil, and sow the seed very thickly—using three to five bushels per acre. Rake on the seed lightly and roll. Keep the grass closely clipped with a lawn mower during the summer. In this way only can the weeds be kept down and a thick, velvety turf formed. A very good machine may be procured for about six dollars. In the spring it is well to rake off the dead leaves and roll the ground, but the practice of burning over the lawn is not to be commended.

### WHAT TO PLANT AND HOW.

The selection of trees and shrubs for planting is always perplexing. A few general principles may aid in solving the question. First of all,--do not attempt too much. Grounds that are crowded, even though the plants of themselves may be choice, have the appearance of an overdressed person.

Do not discard native plants because they are common. The Beeches, Maples and Elms, the Viburnums and Dogwoods, and the Rhododendrons and Kalmias are unsurpassed in their respective classes.

Do not invest freely in untried things. If you have enterprising and experienced neighbors, consult with them. Otherwise, correspond with some reliable nursery firm, or with some person in whose judgment you have confidence, for advice in specific instances. It is usually safer to deal directly with some reliable firm than to place your order with an agent. As a rule, you will

pay the agent fully fifty per cent more than the same goods would cost if purchased direct.

In making a selection of flowering trees and shrubs, aim to secure a succession of bloom, in order that the grounds may be attractive all summer. Among the earliest flowering hardy shrubs are *Daphne mezereum* and the *Forsythias* (of which *Forsythia Fortunii* is the best), which bloom before putting forth leaves,—usually about the first of May. Following these shrubs are the Magnolias, which will succeed in the southern part of the State, the Red Bud or Judas Tree, and the Hawthorns among small trees. Some of the best of the second early shrubs are the Azaleas, Bush Honeysuckles (*Lonicera Tartarica*), Japan Quince, Lilacs in variety, Double Flowering Plum, Flowering Almond, and the earlier flowering Spiræas—especially *Spiræa prunifolia* and *Spiræa Thunbergii*,—also the Weigelas and the Mock Orange (*Philadelphus*). In late summer we have the late Spiræas, as *Bumalda*, *Billardi*, *Callosa*, etc.; the "Smoke Bush" (*Rhus Cotinus*), and, best of all, the hardy Hydrangea (*Hydrangea paniculata grandiflora*).

The brightness produced by bulbs and hardy perennials will well repay a small outlay in this direction. In earliest spring we have the Christmas Rose (*Helleborus niger*), the Snowdrops (*Galanthus*), Crocuses and Pansies. A little later Tulips and Hyacinths appear, and these are followed by Columbines, Lily-of-the-valley and Bleeding Heart (*Dicentra*). In summer and early fall the Japan Anemone, the Golden Columbine (*aquilegia chrysantha*), the Foxgloves, Hollyhocks, Plantain Lily (*Funkia*) and the numerous species and varieties of true lilies, are all very satisfactory and are easy of culture.

In handling trees, be careful to keep the roots moist. A plant is a living organism, and is as truly sensitive to neglect as is an animal. A plant out of ground with roots exposed to sunlight and drying winds is as much out of place as is a fish out of water.

### WHEN TO SET.

As a rule, in this climate, spring planting is advisable; but it is well to secure nursery stock in the fall if a root cellar or other convenient place for storage is available, as stock from Massachusetts or New York is likely to be too far advanced before our soil is ready to be worked. All planting should be done just as early in

the spring as possible, that the trees or shrubs may become established before the leaves put forth. Hardy herbaceous perennials, such as Phlox, Digitalis, Hollyhocks, Columbines, etc., should as a rule be planted in September. The same is true of most bulbous plants including the Crocus, Hyacinth, Lilies, Tulips, etc. The Gladiolus is usually set in the spring.

ARRANGEMENT.

The effective arrangement of trees and shrubs is often a most difficult problem. One of the first things to accomplish is the screening of out-buildings and other disagreeable objects. The best plants for that purpose are evergreens—especially those which appear best at a distance, as Norway Spruce, Austrian Pine or Arbor Vitæ (White Cedar.) It is not necessary that the planting be done in formal belts, or hedges. Irregular groups so arranged that the view is obstructed are better than formal hedges.

There should be an apparent reason for a change of the course of a walk or drive. This may be accomplished by planting a group of shrubbery at the junctions of walks and drives and at the more prominent curves.

There may properly be a border of low growing shrubbery next to the house, and it is well to plant a vine of some sort by the piazza. Nothing is better for this purpose than the common woodbine.

As a rule we desire the grounds about the house to appear larger than they really are. To accomplish this, avoid too great a variety of colors; make as few walks and drives as possible; avoid straight lines; do away with boundary fences. The "flower garden" should be a little at one side of the house rather than directly in front. Nothing adds more to the attractiveness of the place than a well kept lawn in front of the house.

The general appearance of the "Home Place" is usually a good index to the habits and characteristics of its occupants. The thoughts and tastes of a man are largely displayed in arranging his home. If the home is slovenly, the man is seldom a neat workman or a thorough business man, while neatness in the home inspires confidence.

## THE UTILITY OF THE BEAUTIFUL, OR, WHY CHILDREN SHOULD BE EDUCATED IN FLOWERS.

Pomology in all its range is so closely allied to floriculture that it seems impossible to treat of one without the other. The science that deals with fruit must also include the flower, as all fruit is only the flower brought to perfection.

The botanist sees the apple in the delicate blossom as perfectly as the pomologist does in the ripened pome. As science broadens, specialists become the order of the day, a single line of work demanding the entire attention of the individual or society. Would one study thoroughly any kind of fruit, he must know it throughout its earlier stage of planthood; its habits as a flower and its development into fruit. No pomologist can fail to be a botanist. He may not have familiarized himself with the books, yet he must know the fruit he cultivates and loves.

In the early days of our Normal Schools before our Agricultural College had made itself felt as an educator, or even the agricultural and pomological societies had begun their teaching in our State, I found it difficult at first to interest, in the study of botany the young men who were fitting themselves for teachers. They met me with, "It is a girl's study," "What do I want of it?" A flower to them was an insignificant thing not worth their attention. Women have always cultivated flowers. A woman who does not love them is an anomaly. Eve, we know, devoted her whole time to the garden—being the first pomologist of whom we read. Adam probably assisted her, but men, as a rule have not been given to the cultivation of flowers, except for gain. But this, in a measure is passing away.

Decoration Day, the transition from the cruelty and barbarism of war to the peaceful mission of flowers, laid lovingly on a fallen comrade's last resting place has wrought a wonderful change. The most significant holiday in Maine to-day is Decoration Day, when men march with banners, to the beat of the drum, bearing not arms, but armfuls of flowers to decorate the graves of both friend and foe. It was my pleasure to be in the White City Decoration Day. The army hat was everywhere. The G. A. R. man interested me more than any other exhibit. I was impressed with the freshness of his uniform as though it had been ordered for the occasion,

but it may have been the bright flowers he wore that gave a roseate tinge to his entire outfit.

Arbor Day is another significant day, contemplating as it does the planting of shade and ornamental trees and seeking to create an interest in tree planting and culture which may eventually lead to the study of forestry. Our Maine forests have been unsparingly sacrificed.

I was pleased last summer to find in the town of Eustis on the Dead River, a well kept pine grove, trees straight and beautiful. It was small; highways bordered it on three sides. In the pleasant inquiries made by several individuals "Have you seen our pine grove?" I read the pride of young and old in this bit of our former glory as a Pine Tree State.

We are never too old to plant a tree. Whittier writes to a friend: "I am sorry to find that the hard winter has destroyed some handsome spruces I planted eight years ago, they had grown to be fine trees. Though rather late for me, I shall plant others in their places for I remember the advice of the old Laird of Dumfiedikes to his son Jack, 'When ye hae neathing better to do ye can be aye sticking in a tree, it'll aye be growing when ye are sleeping.'" Whittier adds, "there is an ash tree growing here that my mother planted with her own hands at three score and ten."

It was a very happy thought to incorporate Arbor Day into our school system—for whatever we would have blossom in the nation we must plant in the schools. The trees children have planted with their own hands will ever after be to them objects of love and care. Arbor Day may be made very helpful as an educator. No subject has called forth a more abundant literature, all its own, than flowers. The greatest and best of earth have sung of them, "Consider the lilies of the field how they grow."

We have no more touching picture of Robert Burns than he gives us, himself, in "To the Daisy" Seated upon his plow, which he has stopped in the furrow, to pick up the little flower he has unwittingly crushed, we hear him say:

"Wee, modest, crimson-tipped flower,
Thou's met me in an evil hour,
For I maun crush among the stoure,
  Thy slender stem.
To spare thee now is past my power,
  Thou bonny gem—"

A love for flowers must lead to a love for good literature. Bryant, Longfellow, Whittier, Emerson, Wardsworth and Tennyson are all aposties of Nature, and many whose names are unknown to fame have bequeathed to us literary gems which must always be associated with the flowers.

The legend of the blue-eyed forget-me-not carries its own moral lesson with it.

"When to the flowers so beautiful,
The Father gave a name,
Back came a little blue-eyed one—
All timidly it came
And standing at the Father's feet,
And gazing in His face,
It said, in low and trembling tones,
And with a modest grace,
'Dear God, the name Thou gavest me,
Alas! I have forgot.'
The Father kindly looked Him down
And said, 'Forget-me-not—'"

The old red schoolhouse over which so much sentiment has been wasted was never a thing of beauty. It was usually located in an out of the way place, on land not worth cultivation, cheaply constructed, to say nothing of its ornamentation.

We sigh when we think even of what our tastes might have been had our youthful educational environments been more suggestive of beauty.

Miss May's picture of the transition of the old red schoolhouse we trust does not apply to all.

"I remember the old red schoolhouse
On the other side of the stream,
Where we went to school together, Will,
When life was like a dream.

I went to the dear old schoolhouse,
Only the other day,
And I sat on the steps where we jumped the rope,
But I did not care to stay.

The blinds were closed, the glass was gone,
And would you believe it, Will!
They were turning round where our wits were ground,
The wheels of a cider mill."

It certainly is no advance in our civilization to turn the schoolhouse into a cider mill. It may be a more appropriate use for the

building. Under the wise management of the Pomological Society we trust cider mills will not be a necessity.

So much depends upon the tastes acquired in the formative period of life, it should be the purpose of our educational system to strengthen the natural taste in all that is pure and elevating and to cultivate a true love for symmetry, proportion and beauty.

On the taste of the individual, depend the habits, and from the habits develops the character. The mission of the true educator is to unfold the crumpled tissue of the child mind and so impress it with things pure and beautiful that there shall be no room for sensuality, intemperance and other vices. Moral elevation must result from familiarity with beauty in nature and art.

The time seems ripe in our State for some aggressive movement in the line of rural decorations. The coming year marks a great change in the ownership of school property. The old district system is to be superseded by the town. It would seem a very proper time to consider the improvement and the ornamentation of our rural schoolhouses. The movement should be an educational one. Some general purpose, something in which all our interests center, something that shall touch us all, something that shall make every spot set apart for the education of the children of the State a delight and a joy, is of more importance to us as a people than tariff reform, demonetization of silver, or the annexation of the Hawaiian Islands. It is necessary that the movement be general, one that shall extend to every little schoolhouse of the State. The cities and larger villages, with commendable pride, are building for school purposes structures that are models of convenience and architectural beauty. These, with their well-kept lawns and ample playgrounds, are among the most ornamental buildings, wherever reared.

This work is foreshadowed in the movement recently made, to place our national flag upon every schoolhouse of the land. Beside unifying us as a people it has inspired every child with a new and fervid love of native land before unknown. No district so small or poor that has not hung out its flag when its patriotism was stirred.

The tendency of our educational system as a State should be, to inspire every child with a love of our own dear Maine, as the freest, purest, most beautiful spot of all the earth. Blended with the love of our national flag should be the love and pride in our State

emblem, with its pine tree emblazoned on a shield upheld by our sturdy pillars—the sailor and the farmer. Its "Dirigo" and star should have a meaning that should make even the heart of the child glow with pride. I recently heard a returned missionary who had been journeying around the world for the past five years, say that she had been asked since her return, "What sight impressed you most?"

She said, "I tried to recall the scenes that had made the greatest impression upon me, and there came before me in thought the time when I stood in the presence of the greatest mountain on the earth. I looked at the eternal snows of that great mountain peak and I was lost in wonder and admiration of the grandeur of that great mountain and it seemed to me that nothing in the world had ever so spoken to my soul of God and His greatness. But I passed on to view some of the marvels of the handiwork of man and I stood in that wonderful spot the, Lâj Mahal, and again I was lost in wonder over the spirit of man. But I want to tell in all this vast journey what has stirred my heart most. It was last Christmas morning on the shores of a heathen land, my mail had not come to me for nine weeks. The first letter I opened was from home —it contained—this, and she held up to the audience a little flag. At the sight of it my heart was stirred as nothing else had ever done, and I said then as now:

> " 'There is a land on earth supremely blest,
> A dearer, sweeter spot than all the rest.
> And thou shalt know where'er thy footsteps roam,
> That land, that country, and that spot thy home.' "

Our fathers and mothers builded well in laying the foundations of our social, political, and religious liberty.

We have now our Memorial Day, our Arbor Day, our flags and our fine schoolhouses in the cities and larger towns. We need better schoolhouses in the country, whose preservation and ornamentation shall be the pride of every man, woman and child in in their vicinity. It has occurred to me that this Pomological Society is in a condition to foster this work by encouraging village and rural improvement societies having for their object the improvement and ornamentation of streets, school grounds, roadways, cemeteries and any other public grounds by planting, and cultivating trees, by locating and protecting grass plots, lawns and boulevards, and generally doing whatever may tend to the improvement and adornment of the place.

The decoration of our school grounds need not be burdensome, in the way of labor or expense. Once create the taste, and it will be done as easily as the flag was procured. The children and teachers must be made the special guardians of every tree and plant. Our own native trees and flowers form the most beautiful setting for our rural schoolhouses. What more beautiful floral ornaments than our native ferns? We may not be able to sing:

"A rare old plant is *our* ivy green
Creeping where no life is seen."

The ivy is very Englishy. Though flourishing well in Canada, it does not thrive in our climate; but we may well sing of the beauty of our native Virginia creeper, or, as it is commonly known, the woodbine. Our native Clematis is another trailing plant well adapted to ornamental purposes. Both of these plants take kindly to cultivation, and in a few years transform ugly, uninviting places into marvels of beauty.

A well located, a well kept, small country schoolhouse, with its ornamentation of lawns, trees and flowers, is more than poetry, more than painting. An encouraging sign of the times is the interest shown in the appearance of railroad stations. The Maine Central has done much to beautify its stations and ground, making them desirable waiting places for travellers and ornamental wherever located. I wrote the General Manager, Payson Tucker, asking him to give me a brief outline of his system. In reply, he says, "We have adopted a style of architecture for our station buildings which is uniformly used. We have also a standard set of colors to be used in painting them. We expect our employes to keep our property in a neat and attractive condition, and I am happy to say that they heartily co-operate with us and do all in their power to put and keep our property in good shape."

There is, I believe, a pleasant rivalry among the station agents. The road furnishing the trees, shrubs and flowers and offering a prize for the most pleasing effect produced. Such a system of ornamentation for our rural school grounds might be made effective either by the town or some society interested. Among the most beautiful of all the exhibits at the World's Fair was that of Horticultural Hall. One could but feel that he would like to eat his way through the pomological display and then wander at leisure amidst acres of flowers. The flowers, what pen can describe them. One Azalia in the French department, yards in circumference, with its

solid mass of pure white flowers was a thing of beauty, a joy forever to all who beheld it.

Flowers, flowers everywhere; out of place, nowhere. The Californian knew that his fruit display was rendered much more attractive by the few bright plants he so artistically placed among his oranges. How cold and barren even the great exhibition would have been without flowers! As I looked at that formidable engine of war, the enormous Krupp gun, surrounded on all sides by missiles and weapons of warfare—the entire building being filled with them, I was rested to turn from these to the fountains and flowers the artistic Germans knew so well how to place effectively, even among guns and bomb-shells.

Columbia can no longer hesitate over her emblems. Corn, our golden maize was everywhere—booths, pavilions, arches, towers made of corn, whole rooms decorated with it, entire buildings filled with it. Corn was king. As a State we need no other floral emblem than our pine tree, this every child should be taught to love and honor. For the nation let us

"Blazon Columbia's emblem,
The bounteous, golden corn."

* * * * *

"The rose may bloom for England,
The lily for France unfold;
Ireland may honor the shamrock,
Scotland her thistle bold;
But the shield of the Great Republic,
The glory of the West,
Shall bear a stalk of tasseled corn—
Of all our wealth the best!
The arbutus and the goldenrod
The heart of the North may cheer;
And the mountain laurel for Maryland,
Its royal clusters rear;
And jessamine and magnolia
The crest of the South adorn;
But the wide Republic's emblem,
Is the beauteous golden corn."

The thoughts I would leave with you are these: The study of flowers should be begun in childhood. Such study is of practical value to the individual, to the community, to the nation; to the individual in the development of pure tastes, right habits and ele-

vated character; to the community by leading to the preservation and beautifying of public grounds where they exist and by creating a demand for them where they have not been provided for in the laying out of the town; to the nation in developing leaders whose lives have been ennobled, by contact with the beautiful and who by such culture have fitted for a more thorough, scientific work in agriculture, forestry, pomology and all other agrarian pursuits; leaders capable of taking the people back to the great heart of nature, to God.

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