# Public Documents of Maine:

BEING THE

## ANNUAL REPORTS

OF THE VARIOUS

## PUBLIC OFFICERS AND INSTITUTIONS

FOR THE YEAR

## 1882.

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VOLUME II.

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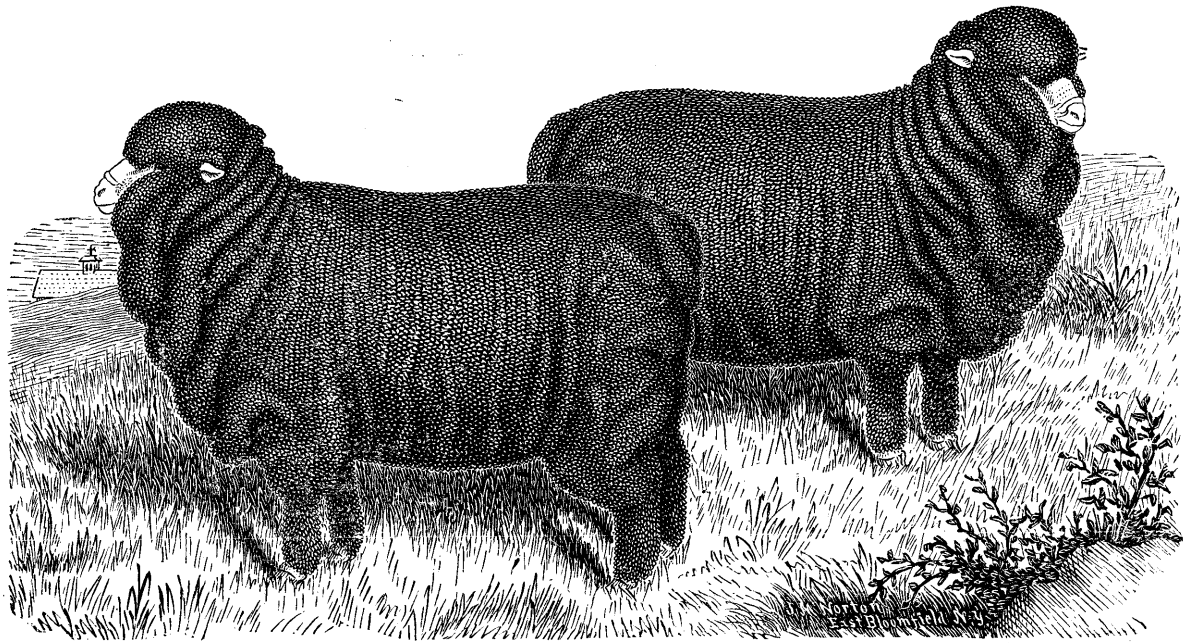
AUGUSTA:
SPRAGUE & SON, PRINTERS TO THE STATE
1882.



MERINO EWES OWNED BY H E. SANFORD, West Cornwall, Vt.

# AGRICULTURE OF MAINE.

## TWENTY-FIFTH ANNUAL REPORT

OF THE

## SECRETARY

OF THE

# MAINE BOARD OF AGRICULTURE,

FOR THE YEAR

## 1881.

PRINTED BY ORDER OF THE LEGISLATURE.

AUGUSTA:
SPRAGUE & SON, PRINTERS TO THE STATE.
1882.

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

In accordance with the law of the State, I have the honor to present the Report of the doings of the Maine Board of Agriculture for 1881.

Z. A. GILBERT, *Secretary.*

EAST TURNER, January 18, 1881.

# MAINE BOARD OF AGRICULTURE—1881.

## OFFICERS.

G. M. GOWELL, PRESIDENT.
A. R. LINCOLN, VICE PRESIDENT.
Z. A. GILBERT, SECRETARY.

MEMBERS CHOSEN BY COUNTY SOCIETIES.

| | | | Term expires Dec. 31. |
|---|---|---|---|
| Cumberland county, | J. Marshall Brown, | Portland, | 1881 |
| Oxford " | S. S. Smith, | Norway, | 1881 |
| Sagadahoc, " | G. M. Gowell, | Bowdoin, | 1881 |
| Somerset, " | L. L. Lucas, | St. Albans, | 1881 |
| York, " | Nathan Dane, Jr., | Kennebunk, | 1881 |
| Aroostook " | J. D. Gove, | Linneus, | 1882 |
| Franklin " | T. B. Hunter, | Phillips, | 1882 |
| Penobscot, " | A. O. Ingersoll, | Lincoln, | 1882 |
| Piscataquis, " | O. T. Goodridge, | Milo, | 1882 |
| Knox, " | Erastus Lermond, | Thomaston, | 1882 |
| Androscoggin " | C. H. Cobb, | East Poland, | 1883 |
| Kennebec " | W. H. Pearson, | Vassalboro', | 1883 |
| Lincoln, " | E. W. Stetson, | Damariscotta, | 1883 |
| Waldo, " | George E. Brackett, | Belfast, | 1883 |
| Washington, " | A. R. Lincoln, | Dennysville, | 1883 |
| Hancock " | Vacancy. | | |

MEMBERS FROM STATE COLLEGE.

President, M. C. Fernald, Orono.
Professor of Agriculture, Walter Balentine, Orono.

ELECTED BY THE BOARD.

Z. A. Gilbert, East Turner, Secretary.

# REPORT.

The annual meeting of the Maine Board of Agriculture was held at the rooms of the Secretary at the State House, January 19, 1881, every member being present, and every county represented, excepting Hancock, wherein a vacancy exists. G. M. Gowell of Bowdoin was re-elected President, and A. R. Lincoln of Dennysville was elected Vice President. The usual committees for transacting the business of the Board were appointed.

A full and free discussion of the work of the Board for the year was entered into by the members, and plans proposed, and methods devised by which to enhance its usefulness to the fullest extent.

A communication was received from the Penobscot County Farmers' Club, asking that the Board take measures to call the attention of the Legislature, then in session, to the necessity for a Fertilizer Control Station to protect the farmers of the State from frauds in the quality of the commercial fertilizers sold in the State, and to use its influence for the establishment of the same. This proposition was unanimously endorsed by the Board, and presented to the Committee on Agriculture of the Legislature with the representation that there is a large annual outlay by our farmers for commercial fertilizers, and that we have no adequate protection of law from frauds in the same; and it was further represented that their use, and the profits from the same would rapidly increase if purchasers always obtained what they supposed they were buying, and could be assured of the correctness of the certified contents. Other States have felt compelled to surround the trade with protection, and have thereby succeeded in driving out all fertilizers which are not up to the standard of quality claimed for them. The Committee however failed to recommend any action, and the matter stands as before. It cannot however rest here, for there are too great liabilities to fraud in the trade for our farmers to be exposed to it, and the trade has reached a magnitude at the present time sufficiently great to claim the protection asked. It may be a question as

to how that protection shall be reached; there can no longer be a question as to its necessity.

A resolution was passed instructing the Secretary to devote special attention during the coming year to the subject of commercial fertilizers, by study and observation, especially in our own State, and gather such data as may be available, as to the amount used and the results secured in practice as effecting profitable crop production. Considerable time has been devoted to this matter, but it has not yet reached a state of completeness to warrant the presentation of anything further than to report progress. It is a matter of great importance to the agriculture of the State, and will continue to receive attention another year.

There is great need of a better knowledge of the soils we handle, and it is now conceded that experimental work accurately recorded; is the only key to unlock the mysteries of soil production, and reveal to the operator the special needs of a soil to render it productive. Measures were taken to institute co-operative experiments among the members of the Board and such other farmers as saw fit to take hold of the matter, and the Secretary, Prof. Balentine of the State College and President Gowell were constituted a committee to prepare plans and issue directions for carrying out the same. Directions and simple diagrams were prepared and sent out to those who signified a desire to aid in the matter, a copy of which with results attending the experiments will be found in another part of this report.

The member from Sagadahoc introduced the following:

*Resolved*, That the State College farm should be managed to a great extent as an educational appliance of the College, rather than as a source of revenue.

This resolution drew out a full and free discussion, by the members, of the relations of the farm to the College, and the opinion unanimously prevailed, that the farm was attached to the institution not as a source of revenue, but as an educator; that while it, of course, might be desirable to have it so managed as to return a revenue, yet its true mission should never be sacrificed in order to make its operations profitable in dollars and cents. The resolution was then given a passage by a unanimous vote.

The remaining time of the session was devoted to the consideration of means and methods of rendering the Institute work of the Board during the year of the highest usefulness to those who are directly engaged in the business of farming.

The attention of the Secretary, so far as the time at his command would allow, has been given to investigations, by observation and correspondence, into the methods now found in the practice of the more progressive farmers of the day, and inquiring into their adaptation to the conditions and surroundings found generally prevailing among those similarly engaged among us.

There is a wide field for profitable labor in this direction, and it is to be regretted that the other duties of the Secretary leave so little time to be devoted to its prosecution.

A Farmers' Institute has been held during the year in every county in the State. In Aroostook, Washington and Penobscot counties, embracing, as they do, a wide area, and so situated that the extremes can not be easily convened at a single point, two Institutes have been held. The reception the Board has met with at these Institutes, and the deep interest manifested by those in attendance have given proof that the farmers of the State are deeply interested in every effort on the part of the State to foster that industry on which its future prosperity mainly depends. The scope of the work done, together with its character will appear from the brief reports of the same herewith submitted.

Observations among the farmers in every quarter of the State shows in a still more marked degree what was indicated a year ago, a healthy revival of interest in the business of farming, and consequently a more undivided attention to its prosecution. As a result, farm products of all descriptions are gradually and surely on the increase. The season to the farmer, on the whole, has been a profitable one. In amount of products, prices realized, and net profits secured in the State at large, probably the year 1881 has seldom, if ever, been exceeded. While crops in general have been fairly bountiful, prices of nearly all products from the farm have ruled high, which has had an appreciable effect upon the receipts. The staple products, from the sale of which farmers largely realize their income, are varying in different localities, dairy products, beef, wool and mutton, in stock husbandry; and as raw products from the soil, apples, potatoes and hay.

Grass having been abundant the year through, beef has been put on the market in larger quantities and in heavier weights than usual, and the price has ruled high, and has held high through the season without the usual falling off at the approach of winter. The fear which has at times prevailed, that beef raising in Maine would

be ruined by Western competition, seems to have been dispelled in the light of present facts. At no time has the price of beef ruled higher the year through when reckoned on a gold basis, than in the year just passed.

Sheep husbandry not only maintains its prominence, but is still on the increase. Fine wool at the present time is taking the lead in value, which gives an increased interest to the Merino flocks of Somerset and Franklin, and is gradually scattering selections from them to other localities. The ruling price for washed wool has been, for Merino forty-five cents per pound, and thirty-five for the coarser grades. Aroostook county is wisely multiplying and enlarging its flocks. The grade of sheep kept are characteristically their own, and are quite uniform throughout the county. They are a heavy weight sheep, high grade or thoroughbred Cotswold or Leicester, and thrive exceptionally well under the extreme care and luxuriant pasturage of that locality. Washington county, too, is awakening to the adaptation of that section to this class of stock, and in every direction is met an increased interest in their flocks.

Under the advantages of high prices for both butter and cheese, and luxuriant pasturage for cows prolonged throughout the entire season dairymen have realized unusually large returns for their year's operations. There is no question but dairying, intelligently carried on, returns a larger income to the operator than does any other branch of stock husbandry. Notwithstanding this, it is doubtful if the business is on the increase save in Aroostook county. Eminently adapted to the business as our own State is, an effort has been made to call increased attention to this industry.

The cheese factories, where operated, have made a profitable season, and are gradually and surely drawing around them an increased patronage from farmers within their reach. Those dairymen who are giving their patronage to the factories are securing larger cash returns from their milk, than is obtained by private enterprise. The price of cheese has ruled steady at from twelve to thirteen and a half cents. Two new factories have been put in operation the past year, one at Patten in northern Penobscot, the proprietor of which has since deceased, and one at Maple Grove in the town of Fort Fairfield, Aroostook county, under the proprietorship of A. L. Haynes. Another will go into operation in the spring in the same county, at Caribou. These enterprises are in the right direction, and if well handled will be sure to build up the

prosperity of those farmers who give them their patronage and make dairying a leading feature of their farming.

An effort has been made to learn the extent of the business of associated cheese making in the State, through the assistance of the members of the Board in their several localities. Returns have been received from nearly all those which have been in operation the past season. Dixfield factory has been in operation, but has not responded to letters of inquiry.

The names of the factories now operated, with the amount of cheese made, are here given.

| Name of Factory. | Began making. | Closed. | Cheese made—pounds. | Name of party making returns. |
|---|---|---|---|---|
| North Livermore Cheese Company.. | June 1.. | Sept. 15. | 20,000 | A. W. Coolidge, Treas. |
| Winterport Cheese & Butter Factory | May 28.. | Sept. 14. | 13,401 | E. Bartlett, Secretary. |
| Turner and Buckfield Cheese Co.... | June 1.. | Sept. 1.. | 14,612 | James M. Allen. |
| St. Albans Cheese Association..... | June 13. | Sept. 17. | 30,314 | A. J. Bonney, Sec'y. |
| Auburn Cheese Company..... | June 13. | Aug. 17. | 7,200 | Ansel Briggs, Sec'y. |
| Stetson Cheese Company..... | June 6.. | Sept. 30 | 40,698 | John Rogers. |
| China Cheese Factory..... | – | – | 7,780 | J. S. Randall, Pres't. |
| East Orrington M'f'g Association... | April 22. | Oct. 6... | 33,000 | A. N. Lufkins, Sec'y. |
| North Newburg Cheese M'f'g Co.... | May 16. | Sept. 12. | 32,353 | C. N. Whitney, Pres't. |
| North Turner ..... | May 2.. | Oct. 21.. | 65,000 | C. W. Berry, Sec'y. |
| Winthrop Dairying Association .... | May 2.. | Sept. 31. | 76,642 | A. C Carr, Pres't. |
| Milo Cheese Manufacturing Co..... | June 21. | Sept. 3.. | 5,460 | H. F. Daggett, Sec'y. |
| East Sangerville Cheese Association. | May 30. | Oct. 1... | 24,000 | J. P. Leland, Pres't. |
| Weld Corner Cheese Factory ..... | June 6.. | Sept. 3.. | 12,025 | E. A. Morgan, Sec'y. |
| South Paris Dairying Association... | June 6.. | Sept. 3.. | 7,980 | J. H. Winslow. |
| North Jay Cheese Company..... | June 6.. | Sept. 17. | 15,751 | O. G. Kyes. |
| Union Dairy Association..... | June 20. | Sept. 17 | 14,052 | Benjamin Eastman. |
| Livermore Center Cheese Factory... | May 28. | Sept. 27. | 18,840 | J. W. Bigelow. |
| East Jefferson ..... | July 5.. | Sept. 3.. | 6,645 | J. J. A. Hoffses, Sec'y. |
| West Minot Cheese Factory..... | June 13. | Sept. 7.. | 18,793 | Gideon Bearce. |
| Nickerson Factory, Houlton..... | May 16.. | Oct. 22.. | 60,071 | Francis Barnes, Prop'r. |
| Maple Grove, Fort Fairfield..... | June 1. | Sept. 12. | 28,759 | A. L. Haynes, Prop'r. |
| Houlton Factory..... | May 16.. | Oct. 22.. | 32,000 | E. Merritt & Sons, Prop's. |
| Dixfield Factory..... | – | – | – | – – |
| Bowdoinham Factory..... | June 6.. | Aug. 13. | 3,493 | – – |
| Ashland Factory..... | June 23. | Sept. 23. | 14,000 | W. Bridgham, Prop'r. |
| Maysville Cheese Company..... | June 6.. | Oct. 8... | 30,292 | Geo. A Parsons, Sec'y. |
| Monroe Cheese Factory..... | June 13. | Oct. 13.. | 25,000 | E. H. Nealley, Sec'y. |
| Patten Cheese Factory..... | June 6.. | Aug. 31. | 20,000 | Owner deceased. |
| South Newburg Cheese Company. .. | May 10.. | Sept. 22. | 25,135 | B. W. Harding, Pres't. |

Estimating the amount made at the factories from which no returns have been received at a total of 35,000 pounds, and we have a total for the State of 732,803 pounds, representing a value of nearly a hundred thousand dollars.

The apple crop takes the lead of the raw products in value. This crop is receiving much attention throughout that portion of the State adapted to its production, and is increasing rapidly from year to year. In no year have the fruit growers received more in the aggregate for their crop than they have realized for that grown the past year. Without doubt, this will have a tendency, as it ought, to still more encourage the planting of orchards, and stimulate to still better care of those already planted. There is no other crop grown which nets to the producer so large a profit.

The crop of potatoes, from which the eastern portion of the State annually receives a large revenue, was extremely light all over the State, not reaching quite up to half of an average crop. Aroostook county, which is engaged in their production to a greater extent than any other section of the State, grew a somewhat larger area than ever before, and harvested, on an average, two-fifths of last year's yield, or about the half of an average crop. This falling off in the crop, however, to those within reach of shipping markets, was nearly made up by the higher value of the crop, the price paid at shipping points being fully twice that of the year previous. In the central and western sections of the State there was only two-thirds the usual area planted. Since the advent of the Colorado beetle, the crop is not in those sections maintaining its former importance. Early planted fields. on a well drained soil, highly manured, thoroughly tilled and kept clean, yielded a good crop.

The hay crop was fully an average one in quantity, but, owing to an unusual prevalence of wet weather during the harvest, much of it was secured in a somewhat damaged condition. The practice of selling hay for shipment out of the State has been for several years past alarmingly on the increase among our farmers. When studied closely, the effect of this will be found objectionable in the main. In a community of farmers, or among individuals practicing this, it is found that their prosperity and wealth is not built up, that they are not surrounded with those comforts, conveniences and luxuries which characterize those who, otherwise similarly situated, make stock husbandry the basis of their income. Owing to its imperfect condition, the sale has fallen off from last year.

Corn is the leading renovating crop in all sections of the State, with the exception of Washington and Aroostook counties, where it is but little grown. There needs no other proof of an increasing

confidence in the profits of its cultivation, than the fact that the area devoted to it is on the increase, there being a larger area planted this year than ever before in the State. Improved methods of culture, and a better understanding of its fertilization and of the care of crop, has reduced the cost of its production quite one half. Although the season was unfavorable in the extreme up to the first of August, yet the yield was fully up to the average.

The growing of sweet corn for canning operations is largely on the increase, there having been several factories erected and put in operation at different points in the State the past year; and several more enterprises of the kind are in contemplation for the next. The returns from the sweet corn are found more satisfactory even than from the yellow corn.

The small grains take a leading position among the farm crops in the eastern part of the State, but elsewhere are not grown in so large quantities. The yield was a full average. Wheat fell off something in area from last year. In Aroostook and Washington counties it still is on the increase, and is fast becoming an important product.

Returns from the county agricultural societies indicate a good degree of interest, as evinced by the large exhibits of stock and products, and by the attendance of interested visitors. Their financial exhibit shows no indebtedness except in a few cases, and those of only a small amount.

The State Dairymen's Association held a public meeting at Phillips in February, for the reading of papers and the discussion of dairy topics, which was an occasion of interest to those engaged in the business.

The State Pomological Society held its customary winter meeting, and also held an exhibition at Gardiner in September. Both occasions were highly successful in point of interest and value. The affairs of this society are ably managed, and the most rigid economy is practiced in its finances. It is, however, much crippled in its work from the need of funds.

The State Agricultural Society held its annual exhibition again at Lewiston, with a large attendance and liberal patronage. A report of its work and of its financial standing will be found in another place.

## CO-OPERATIVE BUTTER-MAKING.

My attention during the summer has been directed to the work of the making of butter by the associated system, and from this examination some conclusions are here presented.

A careful survey of the dairy business of the State presents to the view certain conditions which call for a most candid examination. It is admitted by all who are conversant with the situation, that when all things bearing upon the matter are taken into account, a large part of our State is well adapted to the business of dairying. When placed in comparison with those sections of New England where the business is made a specialty, and where it has been proved that it is bringing to those engaged in it a goodly share of prosperity, we still present a favorable showing. Further than this, it is plainly perceptible to a careful observer among our farmers, that whenever, throughout the entire State, either by individual farmers or farmers in communities, dairying has been adopted as a business and pursued with energy, there will be found thrift and prosperity; the dairyman gaining in wealth, as shown by his surroundings, and the farm gaining in fertility and consequent productiveness, as proved by the crops produced and the stock kept. Yet, right in view of these facts, we find that the business is not receiving the principal attention of any considerable proportion of our farmers as a special feature of their business, nor is it gaining ground to any extent, save in a single county; and the report of last year, that we are not producing all the butter consumed by our population and not one-half the cheese, still holds good

While the advantages of a liberally patronized and well conducted cheese factory are fully established, yet here, as throughout New England, within the area of patronage to cheese factories, the milk is directed to the making of butter for several months of the year, and butter is still a product of not a little importance as a source of revenue to the patrons. Another fact we find, whether it is easily accounted for or not, that a large part of our dairymen do not take kindly to a cheese factory, but prefer, whether wisely or not, to convert their milk into butter. So that the butter product of the

State at the present time—and the same is likely to continue for some time to come—takes the lead in quantity and in value.

There are some obstacles in the way of profitable returns from the business of making butter, encountered here, which call for investigation. While we are making some as good butter as is made in any section of New England, yet a large part of that which goes on to the open market does not meet the requirements of the market, and of necessity is sold for an unremunerative price, and gives no satisfaction where taken.

## Demands of the Market.

The market at the present time calls for new butter directly from the maker from week to week. Where once June butter was called for in September and September butter in January, the taste of consumers is not suited with butter of any considerable age. A good butter is called for and that good butter must be new, still holding the sweet creamy flavor so delicious in new butter but always wanting in that which has been kept any length of time. No other butter at the present time will bring a ruling high price or will find a quick market and a ready sale. The dealer is aiming to satisfy his customers, and their demands are always his choice.

But dealers have preferences, and one of them is that they prefer an article that rules alike in quality when handled in quantity. They want a straight article, an article that is good not only to-day but that can be relied on as proving precisely the same quality right along through the year. The wholesale trade is none the less particular or exacting. When a merchant of Portland or Boston sends to his agent in the country for twenty-five, fifty, or a hundred tubs of butter, he wants them to rule of like quality throughout the lot and prove perfectly reliable.

These requirements of the market are not being met by our dairymen. Those who are making a strictly pure article, reliable at all times, are obliged to deal directly with consumers, and while they may thus be able to obtain a fair price, yet the expense of marketing in that way is large, and there is much perplexity in making and finding a demand; while in the wholesale trade, if a merchant were in want of a ton of butter, there is not a town in the State where that quantity, at any season of the year, can be found ruling even and satisfactory in quality. Many times a single tub will reveal varying shades of color and quite as marked variation as in other

qualities. It is not strange then that our product fails to find a quick demand or make for itself a reputation which would cause it to be sought for in a market controlled by the demands referred to.

A partial remedy would be found in intensifying the business, making it more of a special feature of the farm, and largely increasing the quantity. A Vermont butter maker is always striving to enlarge his business, till he can pride himself on filling a full tub at a churning, where, of course, there is no shade of variation in the contents. A large business also inspires interest in the business, and surely leads to increased effort to meet the requirements of the trade. The larger quantity offered makes it an object for the trade to look after it. But this is not enough.

### Creamery Butter.

Any one familiar with the reports of the New York and Boston butter markets has seen that creamery butter is invariably quoted from two to five cents per pound higher than the best dairy butter, besides being always in demand, however slow the sale of dairy make. "Dairy butter," is the product of a single farm or dairy, and the "best dairy butter" of course is a selection of the very best make among the many dairy farms. "Creamery butter" is the make of a butter factory from the mixed milk or cream of a community of farmers. In the creamery or factory system of making butter it is possible for a whole community of dairymen to reap the advantages of the very highest prices, and a higher price, it is proven, than the best dairymen are able to command in an individual capacity.

Franklin county, Massachusetts, is celebrated for its butter product, and is favored with the best of communication with Boston where its make is marketed. Prof. Henry E. Alvord is authority for the statement that the average price for all sent there from that county during the year 1880, was twenty-four and a half cents per pound; and during the same time western creamery butter averaged twenty-eight cents. If, then, the four hundred and twenty tons of butter sent from that county had been creamery made instead of dairy made, those farmers would have received nearly thirty thousand dollars more for their year's operations, and almost or quite without cost.

During the past autumn months the price of "best western creamery" has ruled steady at thirty-five cents, and always in

demand, and in the winter months still higher. At the same time all through our State, summer made butter from the hands of good butter makers has been vainly seeking a market at twenty-five cents; and I have known of lots of what was choice butter, when made in summer, being sold as low as sixteen cents, costing perhaps a cent a pound to transport it to a market where creamery butter was commanding, at the same time, thirty-five. These are facts which may well claim the study of our dairymen. If our butter is not entirely driven from the market by creamery butter and by adulterated butter and oleomargarine, which can be put upon the market at a low price, it certainly will be depressed to so low a value that there can be no profit in the business.

Still another advantage attaches to the factory system of making butter, as with association in making cheese. It makes it possible to enlarge the business without additional burdens to the household. It is useless to advocate the extension of the business, without devising means to accomplish the work without loading it upon the female help of the family. This system relieves them of all this, and at the same time nets to the producers, as is seen by the above figures, larger income from the business than where the work is done at home.

## Is it Practicable?

An enthusiastic advocate of the system claims that the time is coming when the churn is to be laid away in the garret, where the hand loom long since went, and, like that once indispensable appliance of the household, to be looked upon only as a relic of practices gone by forever.

There are several kinds of creameries in existence, but until quite recently they have all been established on the principle of gathering the whole milk at the creamery, and taking from it such of the cream as could easily be raised for making into a choice article of butter, and then making an inferior article of cheese from the skimmed milk. This practice, while it secures to the farmer fair returns for the milk furnished, yet in many respects it is objectionable, and in somewhat sparsely settled communities like ours in this State, and where comparatively few cows are kept upon a farm, has appeared entirely impracticable. The cost of taking the milk to the factory twice a day, together with the loss to the farm of all the

skimmed milk, are certainly serious objections, and thus far have been of such weight in the judgment of our dairymen as to deter from any efforts at making butter by the creamery system of gathering the whole milk.

There has been, however, another system of creamery butter-making introduced to the attention of the butter-making public, which obviates the objections attaching to the whole milk system, and gives promise of meeting the wants of the business in our State. This is known as the

### Fairlamb System,

or the "cream gathering system." So practicable does this system appear, and so well does it promise to meet the wants of the business in our own State, that some time has been given to an investigation of the work in those localities where introduced.

The Fairlamb system of associated butter-making was first established in Wisconsin and Iowa by Mr. C. C. Fairlamb, a former dealer in dairy products in Philadelphia, who, moving west and engaging in the manufacture of butter, studied up this cream-gathering plan of factory butter-making. This led to the invention of what is now known as the Fairlamb milk-can and the Fairlamb cream transportation-can.

The first butter factory in New England, on the Fairlamb plan, was established at Hatfield, a town on the Connecticut river, in Western Massachusetts, and first put in operation in the autumn of 1880. Since that time factories on the same plan have been established at Lee and at Easthampton, both in the near vicinity of the one first established, and which commenced operations in the autumn of 1881.

### Hatfield Butter Factory.

The factory at Hatfield was visited in the month of August, 1881, and is here described with some minuteness. It was found turning out at that time a choice article of butter, which had already so well established itself in the trade of the adjoining towns that the demand was far greater than could be supplied.

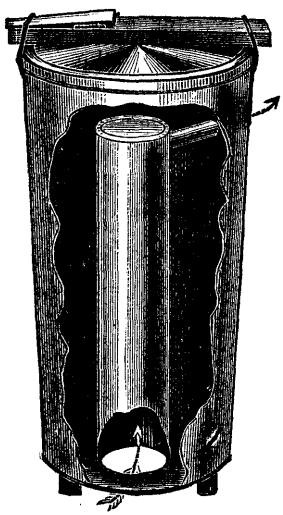
The first move made was to secure pledges of patronage from the cow owners, and after a promise of two hundred cows was secured further action was decided upon. The next step was to raise capi-

tal, which was done in this case in shares of twenty-five dollars each, mostly taken up by the owners of the cows. The stock was guaranteed six per cent interest, to be taken from the gross receipts, and charged as part of the running expenses of the factory. This is precisely after the method adopted in our State in building and equipping the most of our cheese factories. The subscribers to the stock then met and organized a co-operative corporation. The business management was placed in the hands of five directors, one of whom is president, and one superintendent and treasurer.

In this case, buildings were rented furnishing three basement rooms, one for boiler, engine and water tanks, one for work room, containing churn, butter worker, hot and cold water, &c., and the other a store room for storing and curing cream, and packing and storing butter. A brick wall separates the rooms. The cream is received in a room above and conducted to the tanks below. A three horse power engine with six horse power boiler is used for churning, scalding, and heating rooms when needed, costing $275.00. The churn used is a Blanchard, with power attachment, costing $50.00, though any other make can be used at pleasure. Tin apparatus of a capacity for making two hundred pounds a day, consisting of cream-collecting cans, cream-curing tanks, &c., cost $70.00. The total cost of fitting up the rooms and of all the fittings complete, including a wagon for collecting the cream, was $1,200. This covers the equipments of the corporation.

Now, then, for the farmers' equipments. The patrons of the factory are required to supply themselves with the means of setting and creaming their milk in a uniform manner. This becomes necessary in order that all may obtain like results, and each man receive his just dues. Each cow owner then is required to supply himself, at his own expense, with the necessary number of setting-cans of the adopted pattern, which, of course, in this case is the Fairlamb can; and, in addition, must supply a tank for setting the cans in water and securing a low temperature after the manner of the system of deep-can setting now practiced in many dairies. The full-sized can holds sixty pounds of milk. There is also a smaller sized can, for use when there are fractional parts of the quantity required to fill a large can, holding thirty pounds. At the Easthampton creamery the size of can adopted holds forty-five pounds of milk, and

the small ones twenty-eight pounds. The cost of these setting-cans is from $2.25 to $2.50 each.



Fairlamb Milk-can—Sectional view.

These cans have an illuminated scale in the side, at the top of the milk, marked in "inches" and eighths of the same, for the purpose of noting the exact depth of cream upon the surface of the milk. Where the milk of different dairies is set in like cans in water reduced to a like temperature, and kept setting without disturbance the same length of time, an "inch" of the cream taken from the surface will make a like quantity of butter. This is the principle on which the Fairlamb system is founded.

### At the Farm.

The milk is strained, immediately after milking, directly into the cans. The cans are then placed in the tanks with the water surrounding them to their tops and left open till the temperature of the milk is reduced to sixty degrees. The covers are then put on, and the rubber bands, with which each cover is supplied, turned down over the edge of the can, sealing it nearly air-tight from outside influences. They are not opened again by the owner. The temperature of the water and milk is then reduced by the use of ice, or by running water when cold enough, to fifty degrees or lower,

and kept there till the line of separation between the cream and underlying milk is plainly traceable. After this it may still remain in the tank or be removed to any place where the temperature will not rise above sixty. This is all the maker of the milk has to do with it.

The cream is collected and taken to the factory by an employè of the factory and enters as an item of the cost of manufacture. The cream carrying cans are an invention of Fairlamb, and are constructed with a floating cover to prevent all agitation of the cream while on the road, and so arranged that they need not be opened for the purpose of receiving cream. The routes are so arranged as to reduce the miles of travel to the minimum. The gatherer, with wagon and cream carrier, starts out in the morning and takes a circuit of farmers in the line. Arriving at each farm, he notes the number of "inches" and fractions of cream on each can, shown by the illuminated scale upon the side, and makes a record of the same on his book. The owner of the milk can also keep a record of the same if he desires to. The covers are then removed and the cream dipped off by the gatherer with a conical dipper precisely in the manner practiced by our dairymen using similar fixtures. This done, the gatherer proceeds to the next farm, where the same operation is repeated, and so on till the end of his route is reached. The cream is then taken to the factory and conducted to the curing cans, where it remains till ready for churning. Each gatherer has a forenoon and an afternoon route, thus employing his full time. The number of cows which can be reached by a single team daily of course depends on conditions which cannot be determined here. The rule is, in all cases, to take the cream while the milk is sweet. The skimmed milk is left on the farm, where it is wanted, and can be devoted to such use as the dairyman can realize most profit from, while there has been no cost incurred in transporting a useless and bulky material a long distance to a factory which cannot make so profitable a use of it as the farmer himself. The farmer, also, is relieved of all care of making and selling the butter product. This seems to adjust the difficulties of dairying to as satisfactory a condition as can well be. The system seems to meet the wants of a large class of our dairymen in a manner which accords closely with their especial preferences.

### Private Enterprise.

This system of butter-making is entirely susceptible of being conducted as a private enterprise. An individual may provide the necessary buildings and fixtures at his own expense, buying the cream of the dairyman at a stipulated price per "inch," or manufacturing the butter at a stipulated price per pound. The cheese factories in Aroostook county are owned in this way.

### Cost.

The cost of collecting the cream and making the butter, of course, will vary in different localities, subject to conditions which readily suggest themselves. The quantity of butter made per day is among the more important conditions affecting the cost. The experience at the Hatfield creamery indicates that a make of two hundred or more pounds per day will not exceed a cost of three cents per pound. A contract is made for the present year, with the operator of that creamery, to make the year through for three and a half cents per pound—the maker assuming all expense, including interest on stock.

### Patents.

The Fairlamb patents are not on the *system of gathering of cream instead of whole milk*, but on the *fixtures or fittings*—the cans and cream carriers. It does not, therefore, become necessary, in introducing and practicing the system, to use the Fairlamb patent fixtures, unless it is deemed best so to do. A uniform method of setting the milk is necessary, but the particular style of can or arrangement of tank is at the good judgment of those proposing to associate in the business. The Cooley can and tank so extensively in use throughout the State, or the Mosely creamer, would meet the equitable requirements of the system as well in all respects as the Fairlamb cans. It is only a question as to which would be most economical in first cost and require the least outlay of labor to run. The Fairlamb cans were purchased at the Hatfield creamery because they could be purchased at a less cost than other cans on the market. They are found to meet the requirements and are giving perfect satisfaction. At the Easthampton creamery all the fittings were made in the vicinity, from the Fairlamb patterns by arrangement with the Fairlamb Company, thus saving cost of transportation from Chicago to the factory.

## Practical Results.

The enterprise at Hatfield has now been in operation long enough for the results of this system of butter manufacture to become in a considerable measure apparent, and on these results may be based conclusions as to the applicability of the system to our conditions and surroundings. There as here, and everywhere else, they find the trade calling for a straight, even article. The retail grocer, not only in the large cities, but in manufacturing towns and country villages, finds that his customers are not suited when supplied with different makes of butter, varying, as it always does, to a greater or less extent, in shades of quality. Every different make may be good butter, but it is not exactly alike, and consumers detect these shades of difference, are dissatisfied, and the butter is sent back to the grocer, not because it is not good butter in fact, but because it is not exactly like that which has been supplied to them before. This is the cause of great perplexity and of so much loss that the profits of the business are seriously interfered with. A partial remedy has been found in the effort to supply critical customers from the same dairy at all times, but this entails a deal of care on the part of the dealer, and is by no means a complete exemption from the perplexities of the trade; since it is practically impossible to carry this out in all cases at all times.

When the Hatfield creamery began operations, their make was taken to the Boston market where a ready demand was always found at quite satisfactory prices. Little effort was made to introduce it to the favors of the trade in the adjoining towns. Large quantities of butter were handled in those towns, but generally, that trade was fully supplied from the many private dairies of the vicinity, and for this reason did not present, apparently, an inviting field for the introduction of the creamery butter.

At the time of my visit to the vicinity, the factory had run less than a year. The trade had been trying some of the creamery butter and consumers were suited with it. Customers could be supplied with precisely the same article, and a choice article too, right along, all the time, without care on the part of the grocer, only to obtain the creamery butter; and without perplexity from complaints or loss from having it returned. So highly pleased was the trade with it, that they were turning off their private dairy contracts and taking the creamery butter in its place, though formerly they had

bought their butter chiefly in barter trade and were obliged to buy the creamery butter for cash and at a much higher price. Their invariable statement was, that their losses and perplexities from the private dairy butter were not compensated for by the profits on the goods given in exchange. A sharp competition had thus early arisen among the grocers to secure the creamery butter, and the demand was greater than the factory was able at that time to supply.

These results are just what might be looked for in any locality in Yankee land, Maine as well as Massachusetts. The relations of trader and consumer are the same here as there, and the same critical taste prevails among the butter consumers. Besides, to the extent that we are able to put into the market butter of superior quality, and which maintains that quality at all times, to that extent shall we cultivate the tastes of consumers above all willingness to be supplied with those manufactured compounds which are now being sold even here in this State in such large quanties, taking the place in consumption of what ought to be filled by legitimate dairying, and seriously reducing the price of good butter and directly impairing the profits of the business.

### Butter or Cheese.

It is not proposed to here discuss the comparative profits of the factory system as applied to the making of butter, with that of cheese. Cheese-making by the factory system is well established in this State, and those who are patronizing the business are securing results satisfactory in a high degree and profitable to a degree not before reached in their dairy business. There are other communities who are not disposed to patronize cheese factories and who are endeavoring to work prosperity out of private butter dairying. The preferences, wants, conditions and prospects surrounding the business at the present time, which have been alluded to, render this a difficult thing to do. If the surroundings are such that coöperative effort can be entered into as an aid, far greater profits would accrue to such a community, and a deal of labor, in the manufacture and in the sale, saved for other profitable employment. The large quantities of butter sold in our State, at the low price which such butter now must be sold for, is made at a loss—it costs more than is received for it. There is every promise that these relations of

receipts to cost will, in the future, be widened rather than remedied, so long as present methods of manufacture prevail.

The necessary room for factory butter-making can be secured at much less cost than was incurred in the erection of our cheese factories. There is not so much room required. The fixtures for manufacturing probably would not widely vary in cost from those required in a cheese factory.

Coöperative butter-making is commended to the dairymen of the State in the full belief that the quality of the great bulk of butter put into the hands of the trade must be made to come up nearer to the wants of consumers, or oleomargarine and butterine will drive them from the markets. It is foolish for us to expect to successfully compete in the same markets with the improved quality of Western coöperative products with our old-time methods and practices.

Iowa can make no better butter than can Maine, only as she does it through improved methods which are as practicable here as there. It is useless for us to hedge ourselves about with the idea that we cannot compete with the West in this or that product, because we cannot adopt the methods through which those products are secured, when, even at the present time, we are, and ever must be, in competition with all our leading productions; and mechanism, coöperation and systematic business are as potent and as practicable in their application on a farm or among a community here in Maine, as any where else. Nor does the argument, that our business must be limited, hold good. All we need to do is to take of our money and extend our business, instead of sending it in loans to the West to enable them to accomplish what is now being done. There is not a shadow of consistency in allowing "Western Creamery" butter to "take the cake" in our New England markets. Here in Maine we have every needed advantage, and when we make the effort we can reach the standard of highest excellence.

There are four reasons why the associated system of butter-making commends itself to the attention of dairymen; and, in determining whether butter or cheese is the more desirable, each should be carefully considered and allowed to have its due weight.

1. The skimmed milk is left on the farm. It cannot be urged that a dairyman should be governed in his choice of the best course to pursue in his dairy business by the matter of the skimmed milk, for this is only a side product left from the business, and is of comparatively small value. Yet, in all kinds of business—and farming

should be no exception to it—all side products should be utilized to their fullest extent, and made to contribute their value to the profits of the business. So skimmed milk has a value on the farm, and may well be considered in this connection. It is also desirable, and possibly above its value. At any rate, its desirability gives it additional value above what is represented in dollars and cents.

A dairyman wishes to raise calves with which to replace other animals. It is a desirable thing to do. If the whole milk be all removed from the farm, it interferes with this business. With the skimmed milk remaining he can, with the addition of other material, raise choice animals at small cost, and entirely within their value.

Again, dairymen find that the making of pork, from the skimmed milk supplemented with other feed, is a profitable branch of their business. Indeed, many of them are finding that this business is quite as profitable as their dairying. Without the skimmed milk it would be impracticable. When this is considered in connection with the importance of the pig as an economical manure maker, it gives a double importance to the business.

2. When butter alone is the product sold from the dairy, the exhaustion of the soil is reduced to the minimum. The selling of butter does not remove any appreciable amount of fertilizing material from the farm.

3. In the system of co-operative butter making here described, there is a vast amount of labor saved, as compared with associated cheese making, in the matter of transportation. In the first place, only the cream is transported to the factory Then this is done in a manner that systematizes the labor and reduces the cost to the lowest possible figure. The farmer is released from all participation in this part of the business, while at the same time, by being done as a part of the factory business, it is done at much less cost than could be practicable if left in the hands of the makers of the milk.

4. Equity in transportation is secured. As the business of transportation of milk is arranged at a cheese factory where every patron is obliged to arrange for the transportation of his own milk, the association is unequal. Those who live near to the point where the factory chances to be located are subjected to very little expense in getting their milk to the factory, while those located at a distance find the expense of transportation a heavy tax. In some cases this tax may amount to nearly and perhaps quite half the cost of manufacturing the milk into cheese. In the one case, it costs the owner

of the milk two cents per pound of cheese to transport his milk and get it made into cheese, while another patron located several miles away, though he may be a stock owner and furnish large quantities of milk, is submitted to a cost, to accomplish the same thing, of three cents per pound of cheese. Practically this amounts to a discrimination among the members of a co-operative corporation.

At the co-operative creamery the cream is collected at the expense of the corporation, not the individual, and is charged to the cost of manufacturing the butter. In this way the cost of transportation and manufacture bears precisely alike on every patron, whether located near the creamery, or at a distance, and thus becomes in its associated aspect, strictly equitable.

# FARMERS' INSTITUTES.

## Washington County Institutes at Danforth and Dennysville.

Since the opening of the European and North American Railway, the northern part of Washington county, of which the town of Danforth is an important center, has assumed an agricultural importance of considerable note. Where it was formerly chiefly interested in lumbering, it is now directing attention largely to farming. The land, chiefly, has been recently reclaimed from the forest, and is productive. The railroad furnishes an outlet for all products grown for sale.

This section being remote from the agricultural center of the county where the Institutes have formerly been held, it was decided to hold one at Danforth for the especial convenience of the locality. The Institute was opened Tuesday afternoon, October 18. The day was stormy, which prevented a large attendance. A goodly number of farmers. however, were present, and manifested deep interest in the proceedings. The speakers present were Dr. A. R. Lincoln, the member from the county, C. H. Cobb, member from Androscoggin county, and J. O. Kyes an ex-member from Franklin county. Dr. Lincoln presided and prefaced the exercises with brief remarks explanatory of the purposes of the Institute, after which the announcement was made that the afternoon would be devoted to a discussion of the subject of fertility, to be opened by the Secretary, who proceeded to speak at some length of what is meant by fertility as applied to soils, and also of the causes of infertility.

Mr. Cobb followed, speaking of the means of maintaining fertility in soils. He said the subject was an important one to the ordinary farmer, and sooner or later it would present itself as an important one to farmers in that locality, for however well their newly cleared lands might now respond with crops, the time would come when this would not be the case without attention on their part to the means and methods of maintaining fertility. In his section the farms were old, but here the original fertility remaining from the

forest was not all exhausted. All farmers know a run-down animal starts slowly and reluctantly, and the same is true of soils. A matter of great importance to the farmers there was the fact established from the experience of farmers, that it is much easier to maintain the fertility of a fertile soil, than it is to build it up after once being run down by exhaustive cropping. To the farmers there intending to continue the business, this fact should not be allowed to escape their attention. All farmers, if they begin in season, have the means within their reach to accomplish this desirable end in the form of stock manure. The saving of stock manure thus becomes an important matter to all—you, who are located upon these virgin soils, as well as others on older farms. When all of this is saved, the fertility of an already fertile soil can be kept up to a high condition of productiveness. This, of course, is based on the supposition that the products of the farm are chiefly fed to stock of some kind instead of being sold off in the form of raw products.

The best arrangement for the saving of stock manures, adopted in practice at the present time, is a barn cellar with plenty of absorbing material for holding the liquids. This may seem a small matter to the farmers here, but farming is made up, to a considerable extent, of small matters. Besides, if long neglected by you, it will in time become, as it has in other localities, of paramount importance. When this matter of maintaining the fertility of the soil is looked after as its importance demands farming will be a more successful business than is now the case.

This was followed by the following brief paper on

## HOME-MADE FERTILIZERS;

BY A. R. LINCOLN.

The wealth of the farmer is in the abundance of his crops, and this depends upon the fertility and upon the working of his soil. As crop after crop is removed from the land, so much must the fertility of the soil decrease, unless proper fertilizers are applied to make good the waste. As it is with the human and animal economy, so it is with the soil. It will not produce without food. Plant life must be fed, and he who denies his land food will find himself in the condition of him who denies his animals food. The land in a state of nature contains the elements of plant life in abundance,

but the supply decreases as man removes his products without adequate fertilizers being supplied. We can look around us and see the land despoiled of its richness, and ask ourselves if we are dealing fairly with mother earth. Should we not repay her for her bounteous supply? That we are robbing her of her riches nobody can deny, and, with the means which nature has placed within our grasp, it is almost criminal for us so to do. It is generally the aim of human kind to so direct our energies as to be able to leave something to our families, and many of us are erecting a monument in the shape of our old worn-out farms to discourage those who come after us; and instead of being a monument of our worth, industry and careful habits, it serves as a guide or finger-board to point *away* from the farm. "Farming don't pay" is the key note of many, and it would seem so in many cases to the critical eye. But he who believes in that saying cannot be made to look into the cause of why farming does not pay. There are many causes, too many, and when the millennium of agriculture arrives, they will not be seen. How shall we save our farms? How shall we make two blades of grass grow where but one grows now? How shall we change the worn-out fields so that they shall laugh with the luxuriance of crops? And we can keep saying "how" forever. If your farm is fertile, hold on to its fertility; don't let it go back on you; and when you remove anything that requires replacing, be ready to replace it. You all know what plant food is. I shall not enumerate the different substances that go to sustain plant life. There is one fertilizer on the farm, however, that is king. It contains all the elements necessary to feed and enrich the soil. That is animal excrements. Now this fertilizer is taken directly from our fields in the form of crops. Is it returned?—can we return it so as to keep up the average fertility of our soil? The answer is, yes. We can do so if the fertilizing elements that we remove are returned. Now how can this be done? By carefully saving all the manure from our animals, liquid and solid. Some think it can't be done, but it can, and we will see how. By using absorbents so that not one drop of anything is lost. And always bear in mind that the liquid voidings are more valuable than the solid. How many farmers believe this, or act as if they believed it? Very few. Chemistry tells us that the fertilizing matter in the urine of animals amounts to one third more than the solid manures, and if we lose one half or more of our animal manures each year, the hills will

soon grow gray, and poverty-weed and golden rod take the place of clover and timothy. Barn cellars with tight floors—barn cellars with the bottoms dishing and tamped with gravel or blue clay until they are perfectly tight—barn cellars with stone floors laid in cement, and sufficient dry muck, road scrapings, leaves, straw, sawdust, anything that will soak up and retain; tanks made of planks, and the contents either drawn off in casks and distributed on the fields in shape of plant food that is immediately available, or soaked up with absorbents and applied—any way so that it can be saved. The valuable manure from the sheep pen can be saved with less expense than any other kind, by merely giving them bedding enough to serve as a complete absorbent. The hog pen, if properly cared for, will turn out some of the richest fertilizers made on the farm, and the expense of making it is merely nominal. Give swine materials and they will almost pay their keeping in fertilizers. There are many ways about our houses that we can save fertilizers in greater or less quantities. The slops can easily be conducted on the fields so as to be a source of profit rather than a source of filth and disease. Green manuring, the plowing in of green crops, has not been done to a great extent in this county. I have seen buckwheat plowed in with excellent results, leaving the soil enriched and light. I believe successful results will be obtained on a larger scale and to a greater extent than has been practiced, and manuring fields this way will become more general. Plowing in clover is largely followed in some localities, and with the heavy crops of clover, so rich in nitrogenous matter, plowed in, capital results must follow. But it takes a man of nerve to plow in a crop of clover. The temptation to cut and feed it is too strong.

It is an old saying, that the prosperity of a farmer should be judged by the size of his muck pile, and it is literally true, provided he uses his muck rightly. Applying muck directly from the swamps to the fields is useless labor. It should be exposed to the atmosphere at least one year, and during the dry summer months it should be thoroughly dried and housed, to be used in winter. Muck will take up nearly five times its weight of liquids. It is like a sponge—it will soak up and if properly handled retain its moisture. Saturated muck taken from the barn cellar is as rich a fertilizer as any barn yard manure. It is a waste of labor to haul muck and stack it with manure. Dry thoroughly, and use it to soak up the rich manures that would otherwise go to waste. Ashes, bones,

pickle after it has been used, vegetable matter of any kind should be preserved, and with skillful application there will be less need of going abroad for commercial fertilizers. Do not go abroad for fertilizers until our resources at home are exhausted, when we will find that much less will be required, and a great saving be accomplished.

England has fields that have been cultivated since the Roman Conquest, and her soil yields far above our newer land. Her fields are like a garden. Agriculture has not depleted her soil, which is far richer to-day than it was centuries ago. She has ransacked the world for fertilizers. Even the State of Maine, in fact Washington county, is called upon to contribute its mite in shape of fish manures. And we look on with indifference, and carelessly see our farms despoiled of their riches. The question of fertilizers is of the greatest importance. It is the life of the farmer, and we must be alive to the fact that success cannot be obtained unless we use all the means nature has given us, and keep up the natural fertility of our land, always having in mind that a crop cannot be raised unless the soil contains *sufficient elements of plant life to produce it.* Don't let these fertile fields go back on you. Your soil is new, and rich in plant food. Keep it so, and use all the means which nature has placed at your disposal to enrich it, and the hackneyed expression that "farming don't pay" will be forever silenced.

After the reading of the paper, a general discussion was entered into, opened by Mr. Kyes, and followed by farmers present.

Mr. Kyes, after alluding to the importance of attending to small matters, stated that instead of purchasing fertilizers for his corn drills, he prepared, and found it cost him less, a compost for the purpose of loam and the droppings from his fowls, and had obtained better results than with commercial superphosphates side by side. This matter of attention to the saving of the means of maintaining the fertility of the soil cannot be urged too strongly. Here you have the native fertility left in the soil, and it should be your aim to hold it.

Mr. Butterfield raised the question which would return the greater results, to apply manure to the surface, or plow it in.

Mr. Kyes answered that the experience of farmers generally had led them to drop the old-time practice of plowing in manures, and they were now practicing surface application upon the furrows.

Dr. LINCOLN, for potatoes—for which crop Washington county is justly celebrated—applies the manure in the drill, but for wheat, broadcast upon the surface, and works it in thoroughly.

Mr. CARSON, of Danforth, had six acres of wheat the last year. From three acres on which the manure was plowed in, he got thirty bushels. The other three acres were surface manured, and the crop was sixty bushels.

Mr. SKILLENGER, of Danforth, makes a practice of applying manure for potatoes immediately after haying, upon the sod, and plowing at once. In spring the whole is plowed up and thoroughly stirred and mixed. This had given him excellent crops.

The question was raised as to the value of sawdust that has lain several years and partially decayed.

Dr. LINCOLN replied that its value was wholly in its power as an absorbent.

## EVENING.

Stock Husbandry was assigned as the subject for the evening, and Mr. C. H. COBB gave an unwritten address of some length, in which he claimed that the question should receive the most careful consideration of every farmer. Its importance is at once apparent if it be admitted that, as he believed, it was in all cases the basis of successful agriculture.

As to what kind of stock to keep, farmers will be governed by the circumstances by which they are surrounded. In many localities the dairy is the most profitable branch of stock husbandry, but is not applicable to all localities. In any case, the kind of stock kept must be governed by what you are endeavoring to do with it. The farmer who is growing young cattle and beef cattle for sale, needs a different class of animals from him who is securing his income from the making of butter. So too, the farmer who is selling milk in the market wants a different class of animals from him who is supplying customers with fancy butter. Success will demand in all cases that the animals kept must be fitted for the class of work to be done.

An animal well kept is worth as much to the owner as two poorly fed. An animal must be in good condition in order to do good work of any kind. It is not far from the truth, that an animal coming to the barn in good condition is half wintered. They should at

all times be kept in good condition, and in all cases and for all purposes should be fed to their full capacity. The best profits are realized where this is done. Steers should be so fed as to acquire early maturity Young animals return more growth for the food consumed than old ones. This holds true with pigs as well as steers, and the practice of killing at seven to nine months old is the most profitable course.

Mr. KYES followed with a paper on the Feeding and Care of Stock, which was again read at the Dennysville Institute, and is omitted here.

Dr. LINCOLN said he had adopted butter-making as a specialty, and had chosen the Jersey cow for the purpose, with much satisfaction. Butter-making had largely increased in that county within a few years. If success is met, however, it must come through liberal feeding and good cows. The idea that a man of small means could not afford to feed well was a fallacy. The fact is no man can make it profitable to do otherwise, for no other than a well fed cow pays for the food consumed. The quantity of butter in the county can be doubled with only a small increase of cost.

Mr. BEACON:—The only way to make stock pay, is to get good stock and keep it well. A good breed of sheep is the best paying stock which can be kept in this vicinity.

Mr. CARSON had had some experience in keeping sheep, and with the best results. They are a stock well adapted to our condition, and which seem to meet the wants of the farmers of the vicinity.

Mr. KYES:—All men are not adapted to the same business. Neither are all men fitted for keeping the same kind of stock. We must consult our own tastes and be governed thereby in a large measure. Men as a rule will succeed best with that stock which they like best; and any class of stock will be found profitable where only good animals are kept and are well cared for and liberally fed at all times.

After an expression of thanks from the Secretary for the interest manifested in the lectures and the discussions, the Institute was declared adjourned.

## DENNYSVILLE INSTITUTE.

An Institute was held at Dennysville, October 20. An intelligent and earnest assemblage of farmers and others interested in agriculture assembled at the neat and commodious town hall, for the purpose of aiding and sharing in the exercises. A large number of varieties of Washington county apples and pears were exhibited by Caleb Gilman and Isaac Bearce of Meddybemps, and choice samples of grains and vegetables by Nelson Allan of Dennysville.

Dr. LINCOLN presided, and the Secretary presented the order of exercises, defining the aims and purposes, and stating that the exercises would be informal and largely in the form of discussions, to be engaged in by all those present, interested in the subjects in hand, and urged that questions be presented at any time for answer or discussion on those points where information was especially desired. In this way we should get at most effectually just what was aimed at—the discussion and consequent drawing out of information on those points where further information was most desired.

Mr. COBB remarked at some length on the advantages of a fertile soil as compared with an infertile, and therefrom showed the necessity for attention to the matter of maintaining fertility up to a high standard.

Mr. BEARCE said he had followed the business of farming long enough to prove that it is utterly impossible to meet success by the methods and practices of former times. The soil must be groomed, fed and bedded as attentively as the trotting horse if good time was to be made; and if this is done, success is sure to follow.

Mr. WILDER of Pembroke, an ex-member of the Board, commended the work the Board is now doing. It is a fact that this industry is not looked upon by the people at large in the important light in which it stands. His experience among legislators had proved this to his satisfaction, by the indifference on their part to agricultural matters when they come up for action. The policy he had found prevailing there had not been encouraging to the industry, seeming to overlook the fact that the prosperity of the State is chiefly dependent on its agriculture.

## AFTERNOON SESSION

Was opened with an off-hand lecture by the Secretary, on "Fertility, and the means of maintaining it," the speaker asking that any questions occurring to the minds of the listeners in passing, should be presented, when they would receive proper attention. This privilege was fully indulged in by the many intelligent farmers present, and many important questions bearing on the subject under consideration were fully discussed and filled the time to a late hour.

The question of materials for use as absorbents for liquid manures being up for consideration, Mr. COBB spoke of his experience in the use of dried clay for that purpose. The clay is collected from any available source, spread, pulverized and dried in the hot weather of summer, and in this form is one of the best of absorbing materials. In this dry state it is a great absorbent, and is one of the best retainers of the elements of fertility existing in liquid manures.

## EVENING.

The exercises of the evening were opened by the reading of the following paper by J. O. KYES on

### FEEDING AND CARE OF STOCK.

*Mr. President:* Stock raising is a subject that has been discussed until there seems to be nothing new to be said; but perhaps it will be well for us to renew the subject and see if we cannot get some new ideas out of the examination.

Stock raising embraces a wide range of labor requiring the exercise of skill and intellect. Among the most gratifying as well as significant signs of the times is the increased disposition to investigate and to improve on the past.

The farmer must use his brains as well as his hands—must study in order to compete with other portions of the country. We have a soil adapted to grazing. There is no better pasturing than our thousand hills present.

Then how shall we utilize this pasturage to a profit? First by improving our stock. And in order to do this, the first step is to use none other than thoroughbred bulls to breed from, and raise only the best calves. Dispose of the old natives as soon as a purchaser can be found who will take them, for they are always running their

owners in debt. In Franklin county there are many cases in proof of the correctness of this policy. While some have clung to their old stock, thinking they must continue to go around the old pine stump in the track of a former generation, they find themselves, as regards dollars and cents, in the same condition as their fathers. Those who have looked after the improvement of their stock have invariably made money from it. When one has a nicely made up or nicely matched pair of oxen or steers, or a first class cow for sale, they will always sell for a good price and are always in demand, while a scrub is always a drug at any price. Then, to start with, get good blood, for "blood will tell" every time.

Then, in the next place, they must have good care, for blood without feed will never "tell" and will amount to nothing. From the time the calf is dropped onward give it enough to eat to keep it thriving all the time. The faster it grows the more it is worth. Give oats or wheat bran, or both. It takes a certain amount of feed to sustain life, and all we give over that goes to the growth of the animal.

If one takes a young calf, learns it to drink when a week old, taking great care all the while not to give a liberal ration, then wean it when eight weeks old and turn it to pasture, let it run and look out for itself till snow comes, he will have a calf that hasn't cost much and will be worth no more than it has cost. Such a calf taken to the barn on the approach of winter, with all the nursing one can bestow upon it, will barely be able to survive the spring time, and when turned to grass will struggle along till July before it begins to grow. In the fall he comes to the barn smaller and of less value than a calf ought to be. In looking about for something to eat coarse fodder, there is nothing but this yearling, since the oxen, the cows and the horses must have the good hay, while he must take the straw. So he is put into the barn, fed on the coarse fodder, and turned out in the morning to remain all day to sharpen his appetite, fed at noon, perhaps, on fodder so poor that he would not eat it in the barn. In this manner he is kept through the winter. In the spring he is again turned to pasture and in the fall comes up a two year old worth perhaps ten or twelve dollars—no more than a choice veal is worth at six weeks old. Then the cry is heard "that stock raising doesn't pay in Maine."

Now let a well bred calf be taken, give him milk enough to keep him growing till six months old, then wean and turn into a good

pasture, giving a little extra feed every day, and when he comes to the barn in the fall he is in a thriving condition. Then put him into a warm barn and feed him well, and he will gain all winter, and when turned to grass in the spring is all ready to grow, and no time is lost. Then in the fall you have a good large yearling. When he comes to the barn, if he must be kept on straw put it under him, or if he must eat it, put grain or roots enough with it to keep him growing all through the winter. With a good pasture the next summer, he will come up in the fall, worth, instead of ten or twelve dollars, it will be thirty or forty dollars, which affords you a profit on the feed given. This illustrates the difference between the two methods of treating stock. In the one case the owner is kept as poor as his stock, and in the other he is growing as rich as his stock is fat.

Stock must have care as well as feed in order to be kept at a profit. It is cheaper to provide good warm barns, than it is to furnish food with which to keep the animals warm; for boards and shingles are cheaper than fodder. Then keep the stock, young or old, in these warm barns night and day, allowing them out only while they are drinking. Better still to provide water in the barn where they can drink in a cold day and enjoy it.

Have regular times to feed and water, and do it at that time. If an animal is in the habit of having his morning meal at six o'clock and it is neglected till seven, he manifests great uneasiness and will work off more flesh than the breakfast will put on.

Watch the stock and see that they all get their part of the feed, and that each one has a chance to drink, never being content till every creature has had all his wants supplied and is made comfortable for the night. An animal will not thrive when shaking with the cold all night and is found in the morning curled up into a small compass and covered over with frost. In a good warm barn, and a little straw used for bedding, they are ready in the morning to receive their rations and it will do them good, and yourself will get some benefit from it.

Then last but not least, be gentle to your animals and learn them to like you rather than fear you. Always be quiet while among them, and never get excited. If you do they will partake of the same spirit. If for some cause, while milking, a cow chances to kick, it is better—for her and for you—to coax and caress her and give her a nub of corn or an apple than to break the milking stool

over her and perhaps break some of her bones. This will apply to other stock as well as to cows. Gentleness will make more pounds of beef as well as more pounds of butter.

A discussion followed the reading of this paper.

Rev. Mr. WHITTIER inquired how a calf should be fed the first winter.

Answer: On a ration of hay with wheat bran, oat meal, pea meal or cotton seed meal.

Mr. WILDER said that the question of stock husbandry was of interest to every farmer; and there was great need of increased attention, among the farmers of Washington county, to the introduction of better blood, and also of better care and feed, among their herds and flocks.

Mr. ROBINSON of Dennysville.—One of our failures has been to try to see how long we could keep the stock in the fall of the year without giving anything to eat. He had found out that this was an error. From good care and good feed comes the profit.

A vote of thanks from the citizens in attendance, to the speakers and members of the Board, and an expression of thanks in return for the many attentions and courtesies received at their hands, and for the generous hospitality gratuitously provided, closed a profitable series of Institutes.

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## PENOBSCOT COUNTY INSTITUTES AT PATTEN AND SPRINGFIELD.

A Farmers' Institute was held in the town of Patten, in the extreme northerly part of Penobscot county, on the afternoon and evening of October 25th. The day was badly stormy and the roads in a muddy condition, so that some of the speakers did not arrive till the exercises were in part over. Patten is the headquarters of the Penobscot and Aroostook Agricultural Society, and is the center of an active, intelligent and thrifty farming community. In spite of the unfavorable circumstances under which the Institute convened, a good attendance was secured. Luther B. Rogers,

Secretary of the agricultural society, presided. L. L. Lucas, member of the Board from Somerset County, spoke at length upon the subject of Stock Husbandry, in its relations to a system of profitable farming, and pressing the vital importance of attention to the matter of securing good animals, and the necessity for good care and liberal feed, without which no profits can be realized.

## EVENING.

On assembling in the evening, the Secretary spoke of the character of the work committed to the Board, and the methods by which it was aiming to perform its work, and also the necessity of a systematic effort to investigate the methods and wants of practical agriculture with the view to promote this industry among us.

Prof. Walter Balentine, of the State College, followed with a lecture on Fertility, which was followed by many questions from the audience, after which an adjournment was declared.

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## SPRINGFIELD INSTITUTE.

An Institute was held at Springfield, October 27, in the church at the village, which was kindly tendered for the purpose. A most cordial reception was met at the hands of the citizens of the place, and entertainment was generously tendered to all the members of the Board present, and to the visitors from a distance.

Mr. F. A. Reed was called to the chair. The attention of the farmers of the vicinity has long been directed to the supplying of lumbermen with hay and grain. Recently, however, stock husbandry has been attracting more attention, and at the present time is a matter of interest among them.

At the request of those present, Mr. Lucas repeated the substance of the paper read at the Patten Institute. A spirited discussion followed on the principles of breeding, the characteristics of the different breeds of cattle, and their adaptation to special purposes and their value for crossing with common stock, which continued through the aftrenoon, and was participated in by the members present, and by the interested stock growers in attendance.

The question was raised as to the desirability of crossing the Hereford with Shorthorn stock, and Mr. Lucas replied that this

cross makes a fine growing animal, many claiming it to be the best we have, but the cross never should be used for breeding purposes. Only thorough bred males should be used for breeding in any case and for any purpose. The expense of introducing thoroughbred males for crossing on common stock is not so great as to be beyond the reach of any ordinary farmer. Animals can be bought while young for reasonable prices, and after having been used as long as desired, the maturer animal will sell for enough or more to return the purchase money. So that one can have the service of an animal for his keeping. When it is considered that a single bull answers for a whole neighborhood of farmers, and stamps his characteristics on all of his get, the value to the community of such an investment is at once apparent.

## EVENING.

In the evening a free discussion was held upon the feeding of stock, and the necessity for liberal feeding in order to secure the most profitable results.

Dr. JONES, of Springfield, raised the question whether cattle could be grown in winter on hay alone, and the reply was that a rapid growth could be made, provided the best of hay were fed and the cattle furnished with warm quarters and tended with extreme care. Mr. Lucas dwelt on the necessity for extreme care, and the remarkable results following it when given in connection with good feed.

Mr. INGERSOLL, of Lincoln, the member from Penobscot, illustrated the point by referring to instances of remarkable growth of steers secured by him from the feeding of "oats and peas" as a food ration with hay and straw. This mixture seemed to be just what was wanted to build up bone and muscle in a young animal.

Mr. LINDSEY, of Carroll: This locality has always been in the practice of selling all their good hay to the lumbermen in the woods, and of course leaving only straw, meadow hay and damaged English hay to be fed on the farm. This has been fed to young stock, generally not of the best breeding, and the result has been very little growth in winter and a poor condition when they come out in spring. Going to pasture in that condition, some time is required in which to get a start, and the result, as every one must know, is small, inferior stock. This stock can not be made to thrive in winter on this cheap fodder alone, and so this inferior condition and small

size is the inevitable result of the practice. Now, what I wish to know is, whether, located where we are, it will pay us better to purchase extra feed to put with this fodder and thus secure a more rapid growth, than it does to submit to the results we now are obliged to under present practices.

SECRETARY GILBERT. Taking your statement as a correct showing of your practices, and of the results following, this fodder on which your young stock is wintered amounts to nothing further than to carry your stock over from grass in autumn to grass in spring. So far as any growth is concerned, you could just as well have disposed of your stock in autumn and replaced it in spring by purchase of animals of like weight, and left your fodder remaining in the barns. There is not a man of any experience in this line of practice but has found that the combination of the right material with these poor fodders will, under good treatment, result in a rapid growth of the animal where you have been getting none. An increase of value is thus secured, which will more than replace the outlay for purchased food. So, without going further, you have your purchase money back and something on the value of the fodder fed out. But there is further advantage. Instead of a thin, stunted animal to turn to pasture, which requires the recuperative effects of one or two months of grass feed to start it into growth, you have an animal in thrifty condition ready to grow at once on being turned to the pasture. You have on your hands then, instead of an animal inferior in size and thin in flesh, a large thrifty animal salable for cash at any time, and in your year's operation you have realized the full value for all that has been consumed.

The best food to combine with straw and cheap hay is cotton-seed meal, wheat bran, peas or oats. Oats and peas ground and fed together, theoretically and practically, are one of the best combination fodders for growing animals.

But there is a better way for you than to purchase these feeds—raise them yourselves. You have been raising grain for the woods, and have realized handsomely from it. You can raise grain and sell it to your stock and realize still more for it. This practice, instead of exhausting your soils, as is evident from your present course, would tend to restore that fertility, and thus the soil as well as the owner be benefitted by the change.

The session, though somewhat informal, proved of interest to all present. After an expression of thanks for hospitalities extended, the Institute was adjourned.

## SOMERSET COUNTY.

### Institute at St. Albans.

A two days' Institute was held at the Town Hall in St. Albans, opening in the afternoon of November 1. L. L. Lucas, the member for the county, was called to preside. The afternoon was devoted to an informal discussion of the principles of fertilization, led by the Secretary and participated in by the farmers present. A deep interest in the topic was manifested, and the discussion resulted in a better understanding of fertility and the methods through which it is secured. No report of this session is here attempted.

### EVENING.

After a call to order by the Secretary, Mr. Lucas discussed at some length the claim that stock husbandry is the basis of successful farming. From the situation in which farmers are placed, it becomes necessary to work up the raw products on the farms by feeding to stock of some kind, and thus dispose of them in a more concentrated form than when sold direct. When fed out to stock and sold in the form of meat, wool, butter, or cheese, there is first a great saving of transportation and a reduced cost of marketing; but, what is of still more importance, a large part of the plant food taken from the soil by the crop is left in the form of manure, and if properly cared for will be returned to the soil to aid in keeping up its fertility.

Mr. O. T. Goodridge, the member from Piscataquis county, followed in advocacy of dairy stock as being highly profitable, which drew out a spirited support. A cheese factory is located in this town, and the business of making cheese by the coöperative plan is receiving the attention of the farmers of the vicinity. This claim of the dairy as a profitable branch of stock husbandry brought them out to a man in support of the cheese factory, and of dairying in general. The belief seems to generally prevail among them that their highest success lies in the patronage of the factory. Yet it was said that although its patrons were earnest in its support, yet it was not receiving the patronage of so wide a circuit as it ought, nor were those who were patronizing it making this so much of a special feature of their farming as their surroundings would admit.

Mr. BIGELOW, a merchant of the place, said there was proof of the profits of the dairy in the fact that those farmers who were engaged in dairying always had their accounts paid up at his store, and he had noticed that they always had something left for other purposes. Furthermore, on going out into the country, in any direction, it is seen that those farmers engaged in this business as a specialty are always well off.

Mr. N. P. TURNER, of St. Albans, stated that he had tried other kinds of stock, but had found his greatest profit from his cows. Besides, in his experience, he could keep up the fertility of his farm better with cows than with sheep.

There being ladies present who were specially interested in the making of butter, the remaining time of the evening was taken up in questions and answers upon the wants of the market, and methods required by which to meet its demands. It proved of much interest and profit to all present.

## SECOND DAY.

The second day of the session was devoted to a lecture, and discussion following, on the subject of

### FOODS AND FEEDING;

BY PROF. J. W. SANBORN, of the New Hampshire Agricultural College.

Pope says:

> "All nature is but art unknown to thee;
> All chance direction thou canst not see."

Granted, as it must be, that farmers are dealing more with nature than those of any other industry or profession, it follows that they, of all classes, should know or search most for this "art unknown," and this "chance" which is "direction thou canst not see," or if our business is governed most by law, of all classes we should be most benefitted by a knowledge of the laws of our profession; yet of all professions, least of absolute knowledge of its laws is known by ours. Maxims of Cato, two thousand years old,—those that may be picked up coming down the ages from three thousand years ago—would do honor to a modern speaker at an agricultural fair, or to a smart agricultural newspaper of to-day. With its ages of countless workers, stock feeding, until recently, has had no laws defined, and even now the whole art of animal nutrition has no basic laws, or no principles so well defined in the public mind that

any proposition of much breadth can be started in this audience without very quickly being challenged. Without any well defined principles, feeders ever have been, and are now for the most part, feeding blindly. One feeder finds some one feeding a certain way under given conditions, with what he guesses are good results, and with animals of differing age and fed for a different purpose, some neighbor imitates, with probably unsatisfactory results, if a close watch is kept; but generally we imitate and take the results that come. Experience sets the fashion in one direction, and conflicting experience, when after a long time it has gathreed force, changes it in another. The proper time to cut our fodders—hay as an illustration—in public opinion from Roman times, has undergone many changes. And yet between the extremes of the views held as the proper time to cut, millions are involved in the hay of New England alone. It is passing strange that the farming world has been content to guess its way when facts can be so easily obtained, and stranger still that when the facts are obtained they circulate so slowly, and in fact meet with actual antagonism. Evidently common experienee has failed to fill our just expectation, and as it is facts, not fancies, whole truths, not half truths, needed, let it be the work of this generation to search without prejudice for exact facts, and to accept with readiness well taken truths. There are some laws of animal growth and nutrition already settled and many facts that bear directly upon economical animal growth and the growth of its products, not fully understood by the farm public, or if so, not appreciated, at least enough to enforce their practice.

## Good Steers.

In a talk before the Board last winter upon another subject, I reviewed some laws of animal growth and nutrition; but before another audience, I wish to state a fact or two upon two or three points therein that will enforce the same moral and teach other facts or be of interest in other directions. Every element of success must be used by the New England feeder, and none more important than that the animal that is fed should be the best machine for the purpose. I may illustrate all that I mean by one class of facts from among the many occurring in my experiments. Both lots of steers in the following experiment were of like breed and there were two in each lot of two-year old steers:

Jan. 13, lot 1 weighed 2,068 lbs., feed, timothy hay and corn meal.
Jan. 13, lot 2 weighed 2,065 lbs., feed, timothy hay, no grain.
Lot 1 ate in 56 days 2,172 lbs. hay and 446 lbs. meal;
Lot 2 ate in 56 days 2,502 lbs. hay and no grain.
Lot 1 gained 65 lbs.; lot 2 lost 12 lbs.

Change of food, lot 1 on food of lot 2 and lot 2 on food of lot 1.
Lot 1 gained on 2,725 lbs. hay for 56 days, 113 lbs.;
Lot 2 gained on 2,145 lbs. hay and 500 lbs. meal in 56 days, 117 lbs.

In first period 446 lbs. meal took the place of 330 lbs. hay. In second period 500 lbs. meal took the place of 580 lbs. hay. In both periods lot 1 ate the most.

No animals should be reared or bought that do not, so far as can be ascertained, possess good appetites and also good digestive and assimilative capacities. It will be seen that lot 1 in first period while eating 330 lbs. of hay less than lot 2, ate 446 lbs. of meal, while in second period lot 2 ate 580 lbs. of hay, but only 500 lbs. of meal to make it up, and in neither period made as good use of food as lot 1.

It is a common remark that "large animals," Durhams being named, "are not the farmer's cattle, for they are too dainty." I have fed several breeds, and purchased animals of all grades from poorest up to very good ones, and it is my experience that the good beast is the best feeder. If the "farmer's animal" is the animal that will bear stinting, the best is not the one, for he is good as the product of liberal feed; but being possessed of large digestive and assimilative capacity and a strong tendency to rapid growth, he has a vigorous appetite, and I have found him always my best eater of poor food, yet I would not urge any breed nor would I select a breed because I could feed it poor food to as good advantage as a poorer one. We want no animals for poor food, because we cannot afford to feed poorly. The point I would enforce is that vigorous digestion and assimilation with good appetites are essential to successful feeding with us, and give the figures to illustrate.

## Early Maturity.

The older an animal grows, the more food it requires to make a pound of growth. In your report of 1880, I have presented facts enough to fix the certainty of the law, yet will add for a purpose the following table of facts from the Cattle Show of Islington, England, for 1879, prize animals:

| | | | Lbs. |
|---|---|---|---|
| 7 | Shorthorns, average growth per day, | under 2½ years, | 2.06 |
| 15 | " " | from 2½ to 3½ years, | 1.79 |
| 8 | " " | " 3½ to 4½ years, | 1.62 |
| 8 | Herefords, " | under 2½ years, | 1.91 |
| 12 | " " | from 2½ to 3½ years, | 1.70 |
| 4 | " " | " 3½ to 4½ years, | 1.44 |
| 7 | Devons, " | under 2½ years, | 1.52 |
| 9 | " " | from 2½ to 3½ years, | 1.27 |
| 6 | " " | " 3½ to 4½ years, | 1.21 |
| 7 | Sussex, " | under 2½ years, | 1.88 |
| 6 | " " | from 2½ to 3½ years, | 1.72 |
| 4 | " " | " 3½ to 4½ years, | 1.65 |
| 9 | Cross breeds, " | to 1,025 days, | 1.90 |

The younger animals grow more per day, and weighing less, consume less for a greater growth. Thus, while I have found about 18 pounds of hay needed for maintenance of a 1,000 pound steer, a calf will grow a pound a day on from 7 to 10 pounds of hay daily, or on about one-half the food of support of a larger beast. The comparative growth of the several breeds is seen, and while it does not follow positively, in the minds of many, that because the small breeds grow less rapidly that they consume more for a pound of growth, yet experience that I have had in weighing small breeds and their fodders against large ones, and Merino sheep against Cotswolds, with the law that large animals expose less surface for the radiation of heat than small ones in proportion to weight, makes it more than probable that a pound of food is more productive to large animals than to small, provided they mature for the market at the same age.

### Excrement of Food.

Each food has its own value for plant food. Manure values of food vary more than five fold. Hence the cost of animal products will be very materially modified by the manure value of foods. Your Board of Agriculture Reports contain these manurial values of foods, and my previous remarks cover the same points. My apology for the review of all the previous facts, when stated by me before in Maine, is the fact that I desire to name in this talk the leading laws that modify the cost of animal products. Thus I have merely mentioned them in order to collect in a system matters that ought to be regarded as settled and come into common application.

## Animal Nutrition a Science.

While animal nutrition is not an exact science like mathematics, yet there have been exact data enough taken and organized into propositions, which if not always having the full force of a positive law, yet are definite enough to overthrow many old land marks of common observation, and to greatly affect the economy of feeding. A hasty review of some of the statements ot the animal and vegetable chemist and physiologist may aid those not familiar with the developing science of animal nutrition to see more clearly the force and use of terms now necessarily common to the progressive feeders. The use of scientific terms has repelled farmers in the past; less than formerly, however, is it true now, yet there is still a prevalent call among farmers for what is termed practical talks, meaning by this a statement of how to feed as to number of times, &c., what foods to give, how Mr. so-and-so feeds, which is worth the most, bran or corn meal, &c.,—the old cry for teachings of ever changing experience that has settled nothing, and no call for principles of feeding. Never anything but a farmer and stock feeder, I do not know how to make a practical talk without using terms liable to be termed scientific; but they are merely terms used to designate factors unknown to former feeders and are a part of the modern developments of the art of feeding. The price of the fullest success is to master all of the factors that are essential to it, and whether unfortunate or not, it is a fact that to make the fullest and best use of modern work, the terms that come of its work must become familiar, and it is not at all difficult. We have not been long in finding out what ensilage means, nor ought we to be regarding what albuminoids stand for, if necessary. If I were to attempt an impracticable talk, it would be in ignoring the principles of feeding, and talking the gossip of feeding, yet I shall endeavor to avoid all unnecessary terms.

### No. 1.

### Composition of Animals.

| | Lean Ox. | Fat Ox. | Fat Calf. | Fat Sheep. | Fat Pig. |
|---|---|---|---|---|---|
| Proteine | 15.8 | 13.7 | 15.3 | 13.8 | 11 |
| Fat | 7 1 | 26.8 | 13.1 | 28.1 | 40.2 |
| Ash | - | 3.9 | 4.5 | 3.2 | 1.8 |
| Water | - | 43.6 | 60.1 | 44.8 | 42.0 |
| Contents of stomach and intestines | - | 12.0 | 7.0 | 12.0 | 5.0 |
| Phos. acid | - | 1.56 | 1.64 | 1.13 | .73 |
| Lime | - | 1.74 | 1.93 | 1.19 | .77 |

A hasty review of the table is very suggestive. A fat ox contains nearly four times the fat that the lean ox does, and twice as much as the fat calf; while the lean ox contains more protein (or material that forms flesh or lean meat) than the fat ox, as also does the calf, while the hog varies from each. The question at once arises does the calf that is making flesh and bone fast want feeding the same as the ox that has ceased growth of bone and nearly of flesh, and is as Dr. Laws has shown, making its increase of weight mostly fat. Then there are other questions that arise. Does the ox at rest require the same food as the ox at work; the cow in full milk flow the same as when dry? Then each animal requires a large portion of its food to maintain respiration, and thus if it were traced out in full, it would be found that feeding is a very complex problem, requiring the feeder to feed unlike animals differently; animals alike, at varying ages varying fodders, and each to be fed according to the specific purpose for which it is kept. But is it practicable to so feed? A look into the composition of foods will assure us on that point. Finding that American foods differ, especially our grasses, from German foods, I have taken the compilation of American analyses from the report of Connecticut Ex. Station and added some from our College farm by Prof. Collier:

No. 2.

| | Water. | Ash. | Albuminoids. | Fibre. | Nitrogen, free extract. | Fat. |
|---|---|---|---|---|---|---|
| Timothy, 9 analyses | 13.50† | 3.87 | 6.16 | 28.94 | 45.85 | 1.68 |
| Timothy, 5 analyses for N. H. Ag. College. | 6.95 | 4.92 | 8.64 | 23.82 | 51.70 | 4.99 |
| Hay containing much clover,† 5 analyses.. | 14.30† | 5.34 | 10.94 | 24.14 | 42.97 | 2.31 |
| Clover hay, 4 alalyses | 14.13† | 6.39 | 10.98 | 25.10 | 41.45 | 2.06 |
| Hay from Hungarian grass, 4 analyses.... | 16.7† | 5.77 | 7.63 | 28.14 | 40.28 | 1.48 |
| Low meadow hay, 9 analyses | 9.97 | 5.76 | 7.44 | 30.75 | 43,84 | 2.24 |
| Oat straw of N. H. Ag. Coll. farm, 2 samples | 6.52 | 6.25 | 5.16 | 28.10 | 51.40 | 2.55 |
| Rye straw, 1 sample | 12.50† | 8.03 | 6.89 | 34.20 | 35.70 | 2 68 |
| Maize fodder, 9 analyses | 86.86 | 1.16 | 1.13 | 4.13 | 6.53 | .19 |
| Maize fodder, field cured, 3 analyses | 30.33 | 3.75 | 4.46 | 23.02 | 37.19 | 1.25 |
| Maize fodder, or stover, N. H. Ag. College farm, 1 sample | 16.23 | 6.43 | 4 29 | 23 27 | 48.20 | 1.58 |
| Cotton seed meal, 2 samples for N. H. Ag. College farm | 7.85 | 8.39 | 42.61* | 4.99 | 22.99 | 14.56 |
| Wheat straw and middlings, 18 samples... | 11.53 | 3.82 | 12.64 | 6.74 | 61.81 | 3.46 |
| Maize cobs, 9 samples | 9.16 | 1.32 | 2.22 | 32.04 | 54.85 | .41 |
| Linseed meal, 10 samples | 9.38 | 6.46 | 29.43 | 8.80 | 34.12 | 11.81 |
| Barley, 1 sample | 7.23 | 1.94 | 13.17 | 1.55 | 72.96 | 3.15 |
| Oats, 2 samples | 11.79 | 2.97 | 9.77 | 12.53 | 58.06 | 4.88 |
| Flint corn, 31 samples | 10.58 | 1.50 | 10.70 | 1.56 | 70.19 | 5.16 |

* Three samples. † Reckoned by analyst to uniform water content.

No. 3.

POUNDS DIGESTED IN 100 LBS. AMERICAN FOODS.

| | | | | Albuminoids. | Carb. Hydrates. | Fats. | Ratio. |
|---|---|---|---|---|---|---|---|
| Average | 14 | analyses | Timothy hay..... | 4.25 | 42.13 | .97 | 1 to 10.4 |
| " | 5 | " | Clover " .... | 5.59 | 39.26 | .92 | 1 to 7.4 |
| " | 11 | " | Hungarian hay... | 4.49 | 41,05 | .59 | 1 to 9 4 |
| " | 9 | " | Lean Meadow hay | 3.34 | 35.79 | .75 | 1 to 11 |
| " | 2 | " | Oat straw..... | 2.42 | 38.95 | .86 | 1:17 |
| " | 9 | " | Corn fodder..... | 0.75 | 7.10 | 0.07 | 1:10 |
| " | 4 | " | Cured corn fodder | 2.82 | 43.47 | 1.03 | 1:16 |
| " | 3 | " | Cotton seed meal. | 35.56 | 12.79 | 14.35 | 1:1.3 |
| " | 18 | " | Wheat bran midl. | 7.71 | 49.35 | 3.07 | 1:7.3 |
| " | 9 | " | Corn cobs..... | 0.94 | 44.49 | 0.11 | 1:47 |
| " | 10 | " | Linseed meal.... | 24.72 | 22.90 | 10.51 | 1:19 |
| " | 1 | " | Barley ..... | 10.58 | 60.75 | 2.11 | 1:6.2 |
| " | 2 | " | Oats ..... | 7.32 | 45.12 | 3.85 | 1:7.3 |
| " | 31 | " | Flint corn ..... | 8.98 | 66.01 | 3.87 | 1:8:3 |

From the above tables it will be seen that the amount of albuminoids varies widely, and that by a proper combination of them any desired amount of albuminoids or carbhydrates can be given daily. What those desired amounts are the Germans have been engaged in feeding trials to ascertain. The amounts will be seen in Table 4 that are recommended for the purposes named. Before considering this table I wish to give a brief survey of what the Germans claim are the main

### FUNCTIONS OF FOOD NUTRIENTS.

The protein of Table 1, or more commonly to cover the same materials the word albuminoids is used, is the material used to form the flesh or lean meat, tendons, ligaments and cartilages of the body, the flesh being the greater in amount. Albuminoids and flesh both contain nitrogen, and as the other food nutrients do not, it follows that albuminoids only can form flesh. Then the distinctive function of albuminoids is to make flesh. In this purpose, eminent animal physiologists make it the source of force or work of any kind, including the involuntary movements of the body, always going on, like action of heart, stomach, &c., and a source of fat, and a source of heat in case of necessity. The carbhydrates are the main sources of the heat of the body, and as the greater portion of a food is used up in the body for this purpose, and as a pound of carbhydrates is of far greater heat producing power than albuminoids, they become of much importance. Many investigators

believe that these nutrients are the main source of force rather than the albuminoids, and many facts of investigation lend strong color to this view. The chief function of the fats of the food is to form fats of the body, but fats may be used as a source of heat, and for this purpose are more effective than carbhydrates.

While there is a dispute as to the exact and full functions of food nutrients, exact experiments are needed to determine just what amounts do best for specific purposes. This work the Germans have been doing, and from their results present the following table of digestible amounts needed for the purposes named:

No. 4.

| | Albuminoids. | Carbohydrates. | Fats. | Ratio. |
|---|---|---|---|---|
| 1000 lbs. Ox at Rest | .7 lbs. | 8.0 lbs. | 0.15 lbs. | 1:12 |
| " " at hard work | 2.4 | 13.2 lbs. | 0.52 | 1:6 |
| " Milk Cows | 2.5 | 12.5 | 0.40 | 1:5.4 |
| " Fattening oxen, period 1st | 2.5 | 15.00 | 0.50 | 1:6.5 |
| " " " " 2d | 3.0 | 14.80 | 0.70 | 1:5.5 |
| " " " " 3d | 2.7 | 14.8 | 0.60 | 1:6 |
| Fattening Swine, period 1st | 5.0 | 27.2 | | 1:5.5 |
| " " " 2d | 4.0 | 24.00 | | 1:6 |
| " " " 3d | 2.7 | 17.5 | | 1:6.5 |
| Growing cattle, 2 to 3 mos 150 lbs. wt. | .6 lbs. | 2.1 lbs | .30 lbs. | 1:4.7 |
| " " 3 6 " 300 " | 1.0 | 4.10 | .30 | 1:5 |
| " " 6 12 " 500 " | 1.30 | 6.80 | .30 | 1:6 |
| " " 12 18 " 700 " | 1.40 | 9.10 | 0.28 | 1:7 |
| " " 18 24 " 850 " | 1.40 | 10.30 | 0.26 | 1:8 |
| G. catl. pr. 1000lbs. 2:3m. 150 " | 4.0 | 13.8 | 2. | |
| " " 3 to 6 " 300 " | 3.2 | 13.5 | 1. | |
| " " 6 to 12 " 500 " | 2.5 | 13.5 | 0.6 | |
| " " 12 to 18 " 700 " | 2.0 | 13.0 | 0.4 | |
| " " 18 to 24 " 850 " | 1.6 | 12,0 | 0.3 | |

The art of feeding, then, is the art of giving the desired amounts of albuminoids, carbhydrates and fats daily, and in amounts to be determined by the purpose for which the animal is fed. The art of feeding is indeed broader than this, but that it has past by the old stage of a question of so much good hay feeding is what I would call attention to now, and has become a question, not of hay or grain, but of albuminoids, carbhydrates and fats. It brings us to the same stage that we have arrived at in fertilization. We now no longer regard yard manure as a perfect plant food in practice. No longer can hay be regarded as a perfect animal food. I may illustrate from our College Farm experiment. I find that 7 steers

weighing 500 lbs. each will consume 100 lbs. of such Timothy hay as is raised on the farm, which is of good quality so far as can be seen. By the table it will be seen that those steers need 9.1 lbs. of digestible albuminoids daily, and 47.6 lbs. carbhydrates. Our hay furnishes, by analysis of Prof. Collier, per 100 lbs. 5.4 lbs. digestible albuminoids and 45.5 lbs. carbhydrates. A very small per cent. of the latter short of needs and a very heavy one of the former. We may continue the illustration by noting the effect of a very common practice of adding corn meal to the ration to hasten growth. If 25 lbs. are added to the hay ration, the hay eaten will be cut down to about 80 lbs. in my experience, and then we find that 80 lbs. hay and 25 lbs. of corn meal will give 5.8 lbs. of albuminoids and 52.11 of carbhydrates, an excess of the latter and still a heavy deficiency of the former. We have added a carbonaceous food where a nitrogenous food was needed. Looking down the table of food analysis we find several foods richer in albuminoids than corn meal—bran, barley, oil-cake and cotton seed meals. But as there are carbhydrates enough in the ration and a great deficiency of albuminoids we wish to add a food that will be as rich in the latter as possible in order to require as small a purchase as possible. Therefore we select cotton seed meal, and find by a little mathematics that one half the amount added by corn meal will bring the rations up in albuminoids and carry little or no excess of carbhydrates, by the German assumptions. The tables and this single illustration will show the farmer how to obtain the desired combinations, for by the tables this matter of food combinations, becomes simply a mathematical question. I will note in passing that while the feeder is always to be anxious to bring his amount of the food nutrient up to the proper standard, he is also in the interest of economy to avoid feeding an excess of either. Thus if an excess of carbhydrates is given, German views would regard this excess as virtually waste, to be thrown off the system at some cost of working it off. Yet notwithstanding this fact it is frequently cheaper to feed an excess of some one material, for the market rates of foods are often such as to warrant this being done; and in case that excess is given in albuminoids or fat these may be of use as sources of heat, but it is not considered economy the way the markets run to give an excess in this direction.

### Minerals Required.

Excepting in the constituents of salt which are found to have a favorable physiological action in the system, all foods contain enough of the mineral constituents to form the bony frame work of our animals and fill their offices in the system, with the exception of phos. acid and lime, and so rarely wanting is the former that it may be dismissed without consideration. With lime, however, it is different. If trouble will be taken to consult tables of ash analyses of our plants, it will be seen that those in which we separate the seed from the plant will show a great deficiency of lime in the seed, and an abundance in the stem, while the phosphoric acid of the seed is in plenty but less in the stem. By the common methods of feeding neat cattle, little danger exists of furnishing too little of lime except with the calf. Taking my data from personal work I find that 1,000 lbs. of meal ought to gain a calf 110 to 125 lbs. This gain would contain $2\frac{1}{4}$ to $2\frac{1}{2}$ lbs. lime. This milk and grain of any kind will not furnish the requisite amount of lime. This calculation is for the period between weaning to skim milk and the consumption of hay.

With the hay I have had very much difficulty, when he has been confined to pens, from want of lime in the food. The force of the fact will well be seen in a few figures. My average growth of pigs for three years trials has been 26.4 lbs. for 100 lbs. of corn meal. This 26.4 lbs. live pig contains .43 lbs. lime, while the meal given contained but .03 lbs, or only 1-14 of the desired amount. When deprived of access to lime in some form, they have, I think, universally crippled, and have quite frequently got unable to stand. This I have entirely obviated by adding 1 to $1\frac{1}{2}$ lbs. fine ground bone to 100 lbs. of meal. So constant do my pigs follow in strenth of limbs this use or non use of lime that there is no doubt of the causes. Sifted wood ashes or chalk are sources of lime that are available.

### German Results for American Conditions.

The practical farmer will desire to know whether the German tables are applicable not only to economical practice, but if applicable to German conditions, whether they are to American conditions fully. The Germans do not claim to have reduced feeding to an exact science, nor to have by any means reached final results, yet they believe that they have found principles that in application are

of great value and that their tables are useful approximates to the best rations to be had. Some of their data that have been translated give the appearance that their views as to the very prominent place albuminoids fill in nutrition, as sources not only of flesh but of fat and force, have colored the construction of their tables. Thus in Armsby's work on Cattle Feeding, page 375, a table shows that with 0.41 lb. albuminoids and so up to 0.6 lb. there was no loss of flesh, which facts subsequent trials confirmed, yet they present to us tables showing a requirement of 0.7 lb. daily partly on the assumption that the average stable is colder than theirs and would require more albuminoids, and I suspect that their views regarding its functions leads them to put the amount strong.

The soil and climatic conditions of Germany are different from ours and consequently we find that our forage crop analyses are different from theirs. Thus with Timothy hay as an example, we find American Timothy to analyze, for nine samples, 6.16 per cent. albuminoids, 28.4 per cent. of fibre and 45.85 per cent. of carbhydrates. German Timothy by Wolff's tables gives of albuminoids 9.7 per cent., fibre 22.7 per cent. and carbhydrates 45.8 per cent. Soil and climate modify vegetation, and vegetation may have its influence on animal life. Certainly a cold climate is likely to require more carbonaceous food than a warmer one. I conclude that whether the German results are close approximations enough for Germany or not they may not be for America, and hence that we should receive their work critically, and go over much of the same ground for America.

I shall present further on results in conflict with those of Germans. In the meanwhile I wish to caution farmers against trusting too implicitly in food values based on German valuations of albuminoids and fats 4 1-3 cents and carbhydrates 9-10 cents per pound. These tables are just now in great repute among respected writers. By them cotton seed meal is valued at $3.60 per 100 pounds, while good hay is rated at $1. I have had samples of cotton seed meal that showed a value in albuminoids of more than the entire cost of the food, while a very large amount of fats and 18 to 20 per cent. of carbhydrates cost nothing. This valuation of albuminoids is irrational, and the system as applied to American food values, misleading, although many are using it.

But these valuations are working mischief in another direction. They have drawn attention to the albuminoids of foods and we find

feeders feeding with an eye to obtain a proper consumption of albuminoids and are neglecting the carbhydrates, and their rations are failing from a lack of these though it is not suspected. Messrs. Laws and Gilbert in their trials came to the conclusion that as the food markets of England averaged, it was as difficult to make up the ration of carbhydrates as of albuminoids, economically. I have found for five years that it is more difficult to get a proper and economical consumption of the needed amount of carbhydrates than it is to get the needed amount of albuminoids. That it is so and the reasons therefor will appear further along.

### Poor Foods for Young Stock.

A review of Table 4 shows that young animals consume more albuminoids in proportion to weight than older ones. A review of Table 3 shows that those which are known as our poor foods are marked by a deficiency of albumiñoids. The advice and practice of feeding poor foods to young stock and the better foods to older stock is very common, yet it will be seen that the ratio of albuminoids to carbhydrates in the poor foods is nearer to the wants of a 1,000 pound steer than to the needs of a year old. Both experience and theory agree in regarding this practice radically erroneous. Feeders will deny this, saying that their experience is that young animals will eat poor foods better than older ones and do as well or better than older ones on same food. That this is largely so in regard to amount eaten I will agree, but it does not necessarily follow that the practice is right. The young steers are in the vigor of early growth with keen appetites and good digestion and assimilation. The demands of a system struggling to fill its mission of growth gives an appetite that will be met, even in poor foods, better than will be met with steers nearer maturity, possibly, so far as mere relative quantity of food consumed is concerned, but the great trouble is that there will be a greater shortage of the invaluable albuminoids for growth of flesh. Thus a 500 lb. beast might eat 10 lbs. of oat straw giving .24 lbs. albuminoids and 3.89 of carbhydrates. A 1,000 lb. steer would eat about 17 lbs., giving .31 lbs. albuminoids and 6.6 lbs. carbhydrates, in each case digestible. The first requires of albuminoids 1.30 and 6.80 lbs. carbhydrates. The second 1.40 and 9.10 respectively of each. The first gets 18 per cent. of needs of albuminoids and 57 per cent. of carbhydrates.

The second gets 22 per cent. and 72 per cent. of needs. I would give and do give to young stock, as well as older animals, the poorer foods raised, but supplement such foods by albuminous foods. Many who are feeding albuminous foods with straw and corn fodder according to new theories, in part, are giving to the older animals more meal than to the younger ones, and in proportion to weight. Inasmuch as the older animals need less food in proportion to weight, and a still less proportionate amount of albuminoids, the true practice is to give according to the needs of the beast as discovered by actual trials by exact work. By a careful study of the figures of table 3, it will be found that if cotton seed meal, or any other source of albuminoids, was fed to rectify a lack of this material in a food, straw for illustration, that starting from the calf up to a 1,000 lb. steer, but a very little difference in the demand of each for grain will be noted. In feeding coarse foods I have usually given three pounds of meal alike to the calf, year old, two years old and three years old, although the latter are seldom fed. Without arranging figures further I would advise the entire abandonment of the practice of feeding to young animals the poorest foods, unless they are well supplemented by albuminous meals, for the foods, although eaten by young animals, simply stand in the way of what might be made a rapid growth, and carry the animal to period for maturity twice as long as it need be, and more costly.

## Poor Foods.

It is already seen that straw, swale hay and corn fodder are less effective as cattle foods than hay, in part for lack of albuminoids or flesh makers in the former foods. I shall soon assign other reasons, but in the meanwhile will proceed to answer the probable question, will the addition of albuminous foods, cotton seed meal, peas, bran, blood, and oil-cake meal to carbonaceous foods like straw, &c., give the results claimed, and economical results too? and does it make but little difference whence the source of food nutrients, if digestible, as is claimed? That is, it is said that a pound of digestible albuminoids is nearly as valuable from straw as from hay, the littte difference noted arising from the fact that being more indigestible it taxes the system more to work over and off the undigested parts, a tax not so costly as might at first appear. In answer to the above points, I quote results of the use of various foods for the past five years, making but a fraction of the trials

made, for some of those foods have been used for five successive years, hoping that the averages may soon be of permanent value or reliability. Periods of experiment varied from 45 or 50 days to 98 each. Hay is valued at $15. in the following table, and the following foods not on this year's prices, but about what seems to me has been a fair average price by the car for a series of years. I say by the car for our farmers are getting in the habit of buying grain and fertilizers by the car and dividing. Bran, $20; cotton seed meal, $26; blood, meat and fish (values of these animal products not exact but approximations in lots); corn meal, $24; and straw and corn fodder, $7.50 per ton.

*1878—For 70 Days.*

| Lot. | Feed. | Gain. | Cost per day. |
|---|---|---|---|
| 1, | Swale hay 35.6 lbs. and 8 lbs. cotton seed meal, | 167 lbs. | 23.7 cts. |
| 2 and 8, | Timothy hay 48.5 lbs., | 124 | 36.0 |
| 3, | Straw 34.6 lbs. and 6 lbs. corn meal, | 120 | 20.1 |
| 4, | Straw 33 lbs., 4 lbs. meat scraps and 1 lb. corn meal, | 81 | 22.5 |
| 5, | Straw 35 lbs., blood 4 lbs. and 2 lbs. corn meal, | 133 | 26.5 |
| 6, | Straw 15 lbs., clover 25 lbs., | 150 | 24.3 |

*1879—49 Days.*

| Lot. | Feed. | Gain per day. | Cost. |
|---|---|---|---|
| 1, | Timothy 46 lbs., | 1.40 lbs. | 34.5 cts. |
| 2, | Straw 26 lbs., 4 lbs. fish and 2 lbs. corn meal, | | 21.2 |

*1880.*

| Lot. | Feed. | Gain per day. | Cost. |
|---|---|---|---|
| 1, | Timothy 43 lbs., | 1.41 lbs. | 32.2 cts. |
| 2, | Straw 22.8 lbs., | Loss. | 8.5 |
| 5, | Straw 19.2 lbs., and 6 lbs. new process linseed meal, | .87 | 15.0 |
| 6, | Straw 19.2 lbs. and 6 lbs. bran, | .92 | 13.2 |
| 7, | Straw 19.3 lbs. and 6 lbs. cotton seed meal, | 2.75 | 15.1 |
| 8, | Straw 16.6 lbs. and 6 lbs. mixed meals, | 1.25 | 13.3 |

The above lots of steers were in lots of two of like breeds, age (two years), and previous feeding, for periods of varying lengths.

Corn fodder has also been fed extensively with favorable results. The figures introduced to show the economy of the combinations point their own moral. An illustration from lot 7 of 1880 will be

perhaps more emphatic if thus stated: the 6 lbs. of cotton seed meal fed for lot 7 cost, at $26 per ton, 7.8 cents; subtract this cost from the cost of 43 lbs. of hay of lot 1 at $15 per ton or 32.2 cents and we have 25.4 cents. Now as the steers of lot 7 gained as fast as those of lot 1, and ate but 19.3 lbs. of straw, it would appear that 19.3 lbs. of straw brought over 1.3 cents a pound while hay was rated at 3-4 cent per pound. Of course, I do not mean to draw from this single illustration the deduction that straw is worth more than hay, nor that 3 lbs. of cotton seed meal fed to two year old steers weighing from 800 to 1,000 lbs. each will give as much gain as good hay, but I mean to say that for five years the feeding of meals with straw, &c., has proved effective and economical by the side of hay, and has given results that lead me to attach a value to these coarse foods far above that assigned to them by farmers, and when judiciously fed with meal, approaching in value that of hay in the combination.

A look at the results with clover will reveal inspiring facts. If those results were better than can be depended upon, still my experience is such that I attach a very high value to clover, esteeming it more valuable than good English hay when rightly fed, but of less value when fed alone. It needs to be fed in conjunction with the so-called poor foods, when, by the virtue of the combinations, each becomes more valuable.

### Nutrients Given.

Those of an investigating turn may desire to note the amount of albuminoids, carbhydrates and fats daily eaten. The time has not come to work out the averages, and so I will give a single result. The following is for a part of 1880, or for one period of 40 days, the same given already where the foods fed can be noted. Lot 3 was fed on straw alone, and lot 4 on corn meal and straw.

| Lots. | Albuminoids. | Carbo-hydrates. | Fats. | Ratio of carby-hydrates to albuminoids. | Cost of foods. | Total digestible organic matter. | Total organic matter | Weight of steers on March 14. | Gain. | Gain per day. |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 1.77 lbs | 21.90 lbs | .53 lbs | 1 to 13.2 | 30.5 cts | 24.20 lbs | 39. lbs | 1745 lbs | 57 lbs | 1.42 lbs |
| 3 | .54 | 8.93 | .18 | 1 to 17 | 6.85 | 9.65 | 19.82 | 1650 | *10 | - |
| 4 | 1.16 | 12.42 | .44 | 1 to 11.6 | 13.98 | 14.04 | 23.96 | 1690 | †48 | 1.20 |
| 5 | 2.35 | 9.39 | .51 | 1 to 4.3 | 14.76 | 12.05 | 19.65 | 1635 | 35 | .87 |
| 6 | 1.28 | 10.07 | .46 | 1 to 8.3 | 11.75 | 11.81 | 21.67 | 1621 | 37 | .92 |
| 7 | 2·55 | 8.73 | .92 | 1 to 4.2 | 14.94 | 12.20 | 22.20 | 1642 | 110 | 2.75 |
| 8 | 1.74 | 8.89 | .51 | 1 to 5.9 | 12 85 | 11.14 | 15.67 | 1495 | 50 | 1.25 |

* Loss. † Gain.

This table will quite freely illustrate results that I frequently get, several phases of which I wish to call attention to that are of importance to American feeders. The Germans claim that 0.7 lbs. of albuminoids and 8.0 lbs. carbhydrates are necessary to maintain existence without growth for 1,000 lbs. live steer, yet I have without exception for five years in about 15 experiments with straw and meals obtained results much more favorable than this standard. Lot 4 ate per 1,000 lbs., .68 lbs. of albuminoids and 7 lbs. carbhydrates and gained 0.6 lbs. each. I have noted gains for 49 days on less, or on .35 lbs. albuminoids and 5.65 lbs. carbhydrates; in another case in 1.33 lbs. of the former and 5.34 lbs. of the latter the gain was nearly 1 lb. each daily. In the case of the lot in the table, two periods succeeded the one given, in each of which each steer had his corn meal increased, and the gain increased to over $1\frac{1}{4}$ lbs. each, but during the latter period the fodder was in part corn stover.

Again it is claimed that the source of the nutrient is of but little moment, but not so valuable in straw as in hay. The table and all our experiments show that the nutrients of straw and grain, but straw mainly, have been apparently more effective than from hay by the combination. I call attention to the subject in this form again in order to emphasize again the value of straw when rightly fed and the amazing waste now going on in this country, even in New England. It may be stated in a more condensed way, with the under-

standing that I regard the figures as only approximations. Thus 86 per cent of organic matter in swale hay and cotton seed meal has been cheaper and as effective in one, and only one trial, as in Timothy hay. Seventy-six per cent. of organic matter in the corn stover and meals has been nearly or quite as effective as 100 lbs. in Timothy hay. Sixty-five per cent. of organic matter in oat straw and meals has been nearly as effective, often quite, as 100 lbs. in Timothy. I am not aware that any other experimenter has noticed such a result. I expect, of course, that more work is needed upon this point, but in the meanwhile, after watching the steers for a few years, weighing them from these various rations into and out of the pasture, I confidently advise farmers to have no hesitation in re-valuing their straw, swale hay and corn fodder at a higher rate and to feed it with appropriate meals, the cheapest of which has for years been cotton seed meal and is likely to remain so.

To very young animals it is dangerous to feed except in very small quantities. For growing stock, 3 lbs. for moderate growth answers very well. Calves less, with other meal mixed, and when only 3 or 4 weeks old, but a mere unit if any. I have fed 1 to 2 lbs. to them first winter, and like amounts of some other meal. For fatting steers I am now feeding 5 lbs. with like quantity of corn meal with straw, &c. What the result may be I cannot as yet tell. I sold three fat 2 years old last spring, two of which had not had other coarse food than straw or corn fodder for 98 days, and less than 4 lbs. of meal, but this is not to be expected in average cases. I may note the fact that the animals paid a profit for feeding, and also add the general statement that with the combinations spoken of, I can grow young stock, and get the market rates for the foods given. I regard hay as the most costly food fed in New England, and when the market is any way favorable, very difficult to feed to stock and obtain in meat products the market price of it.

### Broad Culture.

These facts, along with others, encourage me to make a wide departure from the routine methods of our old system of farming, which has its motto of "small acres well tilled," and whose result is hay prominent and occupying the greater portion of our arable land. This system of agriculture has given Maine in round numbers a ton of all grades of hay per acre, more however than it will weigh

out in the spring with the 17 to 25 per cent. of shrinkage it undergoes in the barn.

I have elsewhere and in a previous Report set forth the character of the changes I would make and the reasons therefor. Suffice it now to say that I would greatly increase the area tilled and in partial advocacy would apply the figures of my experiments of our college farm. Assuming the ton of growth of hay per acre for Maine, then a 1,000 pound steer will eat 25 lbs. daily or consume it in 80 days, requiring 2 acres to winter him. In a rotation of crops the tilth will carry 60 bushels of corn and 3 tons stover. This stover will carry such a steer through nearly two winters but will be short by the amount of orts left, and will sell corn meal enough to buy 1-2 ton cotton seed meal, an amount sufficient to go with the stover to maintain a steady growth, and still have corn meal enough left to grow two pigs to the weight of 250 lbs. each, basing the amount of growth of pigs upon the average growth of pigs for three years upon 1,000 lbs. of corn meal. I very well understand that such a comparison is against what is, and for what may be, yet having changed to extensive farming, experience leads me, from this standpoint, to advocate it.

## Palatableness.

I have intimated that there was a more pronounced reason why oat straw and swale hay are accounted so low in value among farmers. From the fact that cattle do not grow when fed alone with it, it has been inferred that it has but little value. It is not a palatable food. Our steers at the College Farm that consumed 43 lbs. of hay daily per pair, eat but 22.8 lbs. (or those of same age and weight eat but 22.8 lbs.). I find that steers of the weight of those fed need about 30 lbs. of hay daily for mere maintenance, making no growth. The fact that the straw fed steers did not gain, in fact lost weight on 22.8 lbs. of straw, is no evidence that straw has a less food value, in fact that they lost no faster is evidence that it is quite valuable. Had those to hay, eaten but 22.8 lbs. hay, they too would have lost weight, yet that would not be evidence that it had no value. Had the straw been palatable, it would have been eaten more fully, and if to the amount of 43 lbs., a growth would have been made. In fact I have had steers consume enough to make a continuous growth for a long time.

In view of these facts, it becomes certain that whenever the feeder can use straw in a ration in such manner as to induce his steers to consume enough, he may feel sure that it has become valuable. Here, then, comes in the necessity of skill in feeding. Successful feeding will always require skill, a something that mere knowledge cannot impart. However exact the science of agriculture may become, it cannot do away to any very great degree, of the need of what is known as skill or, by some, common sense. The ration of straw and clover hay in the table illustrates the value of straw without grain in the right place.

I am now, and have practiced, feeding my steers and some other stock, in the past, with clover hay, corn fodder and straw, much of the time entirely without grain, with a resulting steady growth. I refer now to the stock of the farm and not the experimental lots.

Palatableness is no measure of food value. It is valuable to have a food palatable, perhaps, in order to insure a sufficient consumption in the hands of the unskillful, yet at the same time, in the same hands it might be used to excess. The avidity with which a boy eats sweet foods is well known, but this does not test the value of the food consumed, to him. This half truth understood by feeders, about palatableness, has been of immeasurable disadvantage to the world. It has led us into gross errors to the sacrifice of valuable food materials.

### Early versus Late Cut Hay.

Palatableness is the father of what I esteem to be erroneous views regarding the relative value of hay cut in, or prior to bloom, as against hay cut at a period subsequent to bloom. In a somewhat large experience of farmers' methods of arriving at their favorable opinion of early as against late cut hay, I have found this to be the usual way. A cow or a herd on being fed upon early cut hay, or cut before bloom, as in an instance lately brought to my attention, the early cut hay, put in at bottom of mows, was being fed; then starting at the top of the next mow, late hay was fed. As they are changed from the early to the late cut hay, the milk flow is noticed to fall off, and the conclusion is at once drawn that the early cut hay is the more valuable, and unjustly so drawn. In careful, experimental inquiry for three years, I have obtained facts that lead me to look for an explanation of this falling off of milk flow as noted. I find it in

the following result, or palatableness again. I take 4 steers from a previous food of stover and straw, and divide them into two lots of two each. Neither lot have any prejudices to overcome as regards hay. I put one lot upon hay cut before or at beginning of bloom, the other upon hay cut after bloom and as the seed begins to form or indeed is well formed. Each lot consume for 45 days within a very few lbs. of the same amount of food, or 43 lbs. daily, and those eating the later cut hay gain the most. I change the food, each set having the kind of food the other had before. Those changed from late to early hay go on eating as much as before. Those changed from early to later cut hay do not like the later so well, and instead of eating 43 lbs. consume only about 35 lbs. of it daily, or little more than maintenance fodder, and hence gain but little or really none for a few days, as the contents of the stomach are lessened. Step by step they continue to increase the amount eaten, until at nearly the expiration of the month they return to the amount eaten by the other lot having earlier cut. Thus it is seen that no other result could be expected than that. It will be noticed that the hay is more palatable when early cut and it is therefore reasonable to suppose that some physiological changes take place in the plant subsequent to bloom. It was formerly supposed to be wholly against the feeding value of hay. Point by point we are now learning that valuable changes transpire in the plant as it approaches maturity. The amides and sucrose grow less, and other changes not understood are going on. It is no part of the design of this paper to discuss this question. It will suffice to say that the tendency of chemical investigations is now in the direction of more favorable views in regard to hay cut later than bloom as against hay cut before bloom. They do not, however, as yet assign to hay cut out of bloom a value superior to that cut in bloom.

How the changes may affect the quality of the butter I do not know, but that it may must be admitted, for in further trials with cows I found that the purposes that the early cut hay served in the animal economy of the cow were somewhat different from that served by that cut later. Thus the early cut hay tended more to quantity of milk, a quart of it was poorer in butter than from later cut hay, and did not maintain the live weight of the cows as the later cut. The sum of the nutritive effects of the later cut hay has in all cases been greater than that from early cut hay. It will be

understood that I would not let the seed so harden as to be indigestible, if it does so harden, nor would I by any means allow it to so mature as to shatter in handling. Incidentally it may be mentioned that the quantity grown per acre is very much more when cut as seeds form. How the opinion has ever gained ground that plants at bloom generally have completed their growth, I am at loss to understand unless it be from the fact that the proportion of water steadily grows less as the plant matures, the green weight being no measure of the relative dry weight at the two stages of growth. I have found the growth subsequent to bloom to be very rapid and amounting to upwards of 30 per cent.

### Change of Foods.

It will be observed that the change from a palatable to an unpalatable food is attended by a falling off in food consumption, and necessarily in production. The advice is now common to change foods to give appetite. This is essentially another thing from food combinations. The change of foods necessarily involves the changing from a palatable to a less palatable food. In so changing, the poor food is eaten in amounts so small as to be barely sufficient for maintenance. If the change is a daily alternative of foods it is well, for it becomes in fact the addition of good to poorer foods, or food combination, and will be valuable in proportion to the skill with which it is made. Not always but in the main, where a poor food is used in a ration it will be poorly eaten unless the better food is used in limited amounts, and in such case a small ration of meal will be needed. A daily ration of clover hay, corn stover and straw is with me well eaten and maintains a steady but not rapid growth. A course of feeding that involves a few days of good and then a few of poorer foods is a poor system.

### Feeding Cows.

This section of animal nutrition is so full and complex that I merely propose to suggest a few points, but mainly in the direction of caution. Table 4 shows the amounts of albuminoids, carbhydrates and fats needed by cows in full milk flow. That this German standard is correct may be doubtful. If the fat of the milk and casein is made entirely from the fat and albuminoids of the food, then the rations of our milk cows of New England are in the main

far from what they should be. Whether they are fully correct or not, it is extremely probable that our food rations for cows are generally short in albuminoids, I find and I think it will generally be found to advantage to feed an albuminous meal with our foods for milk. My purpose now is simply to caution against making up such a ration by a careless selection of foods, as one may for steers, with almost sole reference to the cost of the food nutrients. Each food has its own specific influence on the quality of the butter. My first attempt to supplement corn meal by other concentrated meal was by bran. This trial was continued in experiments over 3 years, and universally where a pound of bran was used against corn meal, in like amounts, whatever the total quantity used, the bran gave 15 to 20 per cent. less of butter of poorer quality. It may be noted as of interest that, contrary to popular belief, the corn meal maintained the milk flow slightly better than bran, and the animal weight much the best.

Corn meal for quality in color, aroma and texture may be regarded as the best of our concentrated foods, but it is not nitrogenous enough, and in seeking for a proper food to go with it after trying oats and peas, oil-cake meal, palm nut meal (the latter great for quantity of butter) and middlings, I have found cotton seed meal, in all respects, most satisfactory. The foods that I find most economical, or perhaps more correctly, quite economical, by the side of hay or grain, are clover, corn fodder, straw and 6 lbs. of mixed corn and cotton seed meals. The quantity of butter and its color and aroma are good. Whether its texture is as good I should not as yet dare to say. In the present condition of our butter trade, butter makers will not care to decrease the cost of butter at the expense of quality. I am satisfied that clover and corn fodder with meals named will give good butter. Stover or fodder from which corn has been taken has given satisfaction, with the meals named. The addition of root crops have been disappointing.

## Ensilage.

I am asked to make a few remarks upon the subject of ensilage. Its economy over airdrying of food is very doubtful. The measure of the advantages claimed for it are not doubtful, but certainly very materially overdrawn, even by those not holding the more radical views. A silo costs, if of cement and stone construction, $3 for

every ton of capacity, or if 25 tons are grown to the acre, $75 for silo room for an acre of corn fodder, involving an interest of $4.50 per acre. The preceding sums if invested in stock, tools, chemicals, &c., would work a permanent change in our farm croppings, while the silo adds nothing. Again 25 tons of corn fodder contain 21½ tons of water, the three and one-half tons of dry matter would if air dryed carry but 1 1-6 tons of water on basis of that of ours analyzed by Prof. Collier. Therefore 20 2-3 tons of water are carried needlessly, costing in sums varying from 16 to 20 2-3 dollars for harvesting. This sum with the interest and depreciation of a silo will buy in stover and cotton seed meal nearly or quite as much organic matter as is found in the 25 tons of fodder corn from the silo, and in proportions that would be theoretically as valuable. The policy of handling diffusive crops with high priced labor is questionable, or crops of great weight per pound of available food. The deception of bulk and the meaning of but 3½ tons of dry matter per acre, or 25 tons corn fodder, can be better seen from the fact that we have grown on the College Farm 4 tons of clover, and at least two gentlemen have said to me that they grew 4 tons of millet and Hungarian per acre, for 1881, and each of those will give the 3½ tons of dry matter at much less cost. An inquiry among a large number of those fitting corn fodder for 1881 reveals the fact that they average less than 20 tons per acre, and those who grew 20 tons represent it to be a good crop. My experience leads me to question the assertion that the silo enables one to raise a crop that will give more per acre than could be economically obtained and cared for without the silo. I think I get more available food nutrients per acre from field corn than from fodder corn. By either method of planting, the capacity of the corn plant is exhausted to draw plant food from the soil. With the field corn the crop is matured; by the fodder corn the conditions do not admit of ripening. I find on our College Farm that I can get 60 bushels of corn and its stover, or 3 to 3½ tons, as easy as 25 tons of fodder corn can be raised. This, however, is an estimate. Others whom I consult that are raising fodder for ensilage estimate one ton of fodder corn for every two bushels of corn and its stover. On the latter basis about the same amount of dry fodder is raised by either method, while by the former more is raised. A pound of dry matter matured in the sun by the field corn method, for reasons named under "Early versus late cut hay," I consider more valuable than when

grown thickly for fodder and cut before sap is fully organized. The amount eaten of the stover of field corn will be less by butts wasted, yet I consider the amount eaten will be fully as serviceable as the total grown in fodder corn. The uneaten stover is the poorest part; it is rich in mineral plant food, and it is valuable for bedding and as an absorbent. I have upon two farms harvested 22 acres each of corn without difficulty. Thus I think the claim may be fairly made in view of the results already recorded of the feeding value of stover, that as much or more value of animal food may be grown and cared for by the field corn system as by the fodder corn system.

### Green Food.

Many claim that a pound of green food is more valuable than the same food dried. German feeding trials have shown that food properly dried loses none of its feeding value. It may be so over-dried as to lose some of its leaves by handling, and as one or two investigators have shown may lose dry matter by actual over-drying. This statement of theirs will be called in question by some. Crops are liable to loss by rains, yet after a review of trials made, I find this loss smaller than usually claimed. Notwithstanding that scientists claim, that which is probably true, that crops can be cured without loss, yet under the vicissitudes of practice some small loss must be admitted in curing. The loss in the silo is assumed to be greater. A mass of facts are now accumulating which it is not my purpose to review but to give an impartial deduction from them. It is clear, both from analysis and actual weight in and out of the silo, that losses have been made varying from 15 to 40 per cent. of the total weight of nutritive material pitted.

I think the amount so lost is less than our American chemists have believed necessary, judging by the character of their views of ensilage. Prof. Cook's (of N. J. Ex. Station) analysis of nine samples of ensilage from nine cement silos indicates but small loss, for the average of ash was 1.16 per cent. only, while 9 samples of fodder corn by the Conn. Ex. Station gave 1.16 per cent. of ash. The kinds of fodders used were of different varieties and cut at varying stages of maturity, and hence these figures can only mean, that in all probability, the loss in the silo by fermentation is not so large, in a well regulated silo, as supposed, yet at the same time fair comparative data taken thus far makes it strongly probable, if not certain, that the loss of silo preserved foods is more than the loss in air-curing. I have made several years' trials of stover and

green corn fodder against hay, and can from the results come to no other conclusion than that the loss of fodder in drying is small, if any.

Thus, for 3 years, I have fed each fall from 80 to 100 lbs. of fodder corn against 20 lbs. of hay, with the following result, where 100 lbs. of green fodder were fed 1 pair of cows, against 20 lbs. of hay to another pair: Each set had their fitting period and then a change of food, to note whether effects were due to the peculiarity of the cows fed or due to the food.

Time, August. Yield lot 1 on grass alone in fitting period, 30.17 lbs. milk daily.

Time, August. Yield lot 2 on grass alone in fitting period, 30.60 lbs. milk daily.

Test period. Yield lot 1 on grass and 100 lbs. fodder corn daily, 30.44 lbs. milk daily.

Test period. Yield lot 2, on grass and 20 lbs. hay daily, 32.44 lbs. milk daily.

This is for 5 lbs. fodder corn against 1 of hay, whereas 3 lbs. of fodder corn ensilaged is claimed to be equal to 1 of hay. From all such similar facts that I can gather, I must conclude that either the ensilage has lost in water so heavily that 5 lbs. are cut down to 3 in the silo, or that the fodder undergoes some wonderful and mysterious changes that make it more valuable by far from the pit, or that the ensiligists are guessing wild of the mark. I assume from such facts as I can collect, that it is certainly mainly acounted for in the first and last reasons, particularly the last. A mass of matter of the following tenor could be collected, but for the mere glance at the subject now undertaken, the following will cover the present standing of attempts to add to foods a value by artificial means. In a joint trial by N. Breusler and others, the following conclusions were arrived at: "Souring and fermenting causes a loss of raw material, while boiling, scalding and steaming diminishes the digestibility by the large amount of water. Find steaming of hay diminishes digestion." The animal system it would appear is made for just the purpose of digestion of raw foods, and nothing yet found aids it.

### Practice Settles It,

so it is claimed by ensiligists, in favor of ensilage against any other method, and that is the end of it, say they. Facts are better than theories, it is true, but it is just here that they fail, not having or

offering facts but opinions. The only comprehensive facts taken substantiate all the claims that I have advanced. There have been a few so called trials put before the public, but either they have lacked the critical elements of a useful trial or have been physical impossibilities, as where greater returns were claimed than the actual materials in the food fed contained.

Prof. Cook, of the New Jersey Ex. Station, made an experiment with two lots of cows, covering three periods. Each lot had its food calculated in the 3d period to give the same amount of albuminoids, carbhydrates and fats.

Lot 2 was fed on ensilage, 120 lbs. to each cow, and 5 lbs. each of cotton seed meal. Period 1, they were fed alike and gave, per lot 1, 48.6 lbs. milk daily; lot 2, 49.7 lbs. milk daily; period 3, lot 1, 48.4 lbs. milk daily; lot 2, 48.2 lbs. milk daily.

Here are exact facts and they sustain the claims of scientific men.

Prof. McBryde, of the Tennessee University, has tried a more elaborate set of experiments, an example or two of which I will give:

STEERS.

| Am't fed per 1,000 lbs. live wt. | Wt of Steers. | Loss in 30 days. |
|---|---|---|
| 40 lbs. ensilage, | 825 lbs., | 20 lbs. |
| 50 " | 965 " | 8 " |
| 60 " | 900 " | 24 " |
| 25 lbs. hay, | 687 " | 13 " gain. |

This is a worse showing than I have made with straw, and evidently worse than with stover from which corn was taken, for 23½ lbs. per day made a gain of 15¾ lbs. in 35 days. My ration probably contained less organic matter. Prof. McBryde's was not analyzed. Prof. McBryde in a following trial, with grain added, did make of the combination what I regard a more economical food than hay, but not so economical a combination as I have shown from dry foods and meal.

## ERROR OF ENSILIGISTS.

I have already shown the very great economy of food combinations of meal with straw and stover, and the great increase of animals that can be kept by the system of corn cropping. It is the valuable results of such combinations that they have discovered, and with a half truth, they have made a misapplication, and credited

to ensilage as such, the virtues due to another cause. Without denying that the system is better than hay culture, I question very seriously whether green food pitted is as economical as the same food dried and fed by same method. I feel certain that the silo is far short of the importance claimed for it. In conclusion of this imperfect, for necessarily brief, survey of ensilage, I may say that ensilage will probably fill but a modest place in our agriculture for some time to come, and that as those who are intending to build, will do so only because of belief in the pretensions, I advise such to look very thoroughly into the matter before investing.

The time remaining after the close of this lecture was devoted to a discussion of the many new and suggestive points made by the speaker. An increasing interest in the exercises was manifested to the close. After an exchange of compliments the Institute adjourned.

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## PISCATAQUIS COUNTY.

### Institute at Foxcroft.

Arrangements were made to hold an Institute in Piscataquis county in connection with the Foxcroft Grange, to continue two days. By arrangement the Board of Agriculture filled the programme of the first day, while the second day was filled at the pleasure of those having the matter in charge. The weather was stormy each day, yet notwithstanding this drawback there was a goodly attendance of earnest, thoughtful, intelligent farmers and their wives throughout both days. Such interest in their business is the key to the prosperity which is everywhere manifest among them, to a degree that is met in very few localities in the State. Intelligent application is having a marked effect on the agriculture of this locality.

A hearty welcome and a generous hospitality were extended to the members of the Board and visiting friends. Dinners were served at the hall in generous bounty for all present.

H. L. LELAND of Sangerville, a former member of the Board, after an expression of gratitude in behalf of the farmers of the vicinity, for the privilege and the honor of the Institute among them, extended a brief and fitting welcome to the members of the Board and the speakers accompanying them.

O. T. GOODRIDGE of Milo, the member of the Board for that county, then read the following paper on

## MANURES AND THEIR APPLICATION.

I come before you at this time with a subject of great importance to every farmer. Not that I feel competent to interest or instruct this assembly of intelligent, practical farmers, for I feel there are those who could do that much better than I, but that I may possibly say something that will awaken thoughts in others, and thus bring out the experience of practical farmers. This is what we want—the experience of thoughtful intelligent farmers. By comparing notes in the experience of our farming operations, our successes and failures, we may be enabled to avoid many errors which would have taken us a long time to have found out by our own experience.

Every farmer wishes to make use of all the fertilizers he possibly can, that he may raise large crops, make his farm productive and keep up the fertility of the soil. In order to do this he must have a big heap of manure, the larger the better, and the way to secure this large amount of manure is what we all want to know.

In the first place a good barn cellar or manure shed is indispensable, although I have known some large farmers who had neither, but threw the manure from their stock out in the yard to be washed and leached by the rains and the water from the eaves of the barn. But we all know this is poor policy—there is a better way.

If your barn is so situated that you can't have a cellar, then have a manure shed; the expense will be but little, only a few days to put it up, and how can you spend a few days to better advantage or to more profit than in building a shelter for your manure? I have seen the water that ran from a barnyard during a rainstorm, 30, 40, yes 60 rods from the buildings so much colored that it must have extracted a large amount of the value from the manure, which was carried off in the brooks where it did no good. If there had been a

shed to protect the manure, it would have been saved and been a valuable addition to the land. Experience proves that the manure is stronger when it is kept under cover.

I will suppose we have such a cellar or shed. In the spring after the manure is hauled out, there is usually a time when we are not driven with work. At this time I would haul in muck and cover the bottom of the cellar or shed a foot deep or more, tie up my cattle nights and bed them with some dry muck, straw, brakes, sawdust material, anything to absorb the liquids, which thrown out in the heap will in a short time make a pile which would surprise anyone. Anyone who has not tried it would hardly believe so large a pile of manure could be made during the summer. There is no reason why you cannot make nearly as much manure from your stock in the summer as you do in the winter.

There is no farm but has something on it that can be used for this purpose. If you haven't muck, there are brakes and weeds that ought to be mowed, and the farm would be improved by it. The pasture will produce better and sweeter grasses for having the brakes and weeds cleaned off the land. The dull days in haying time had better be devoted to this work instead of going to the village and spending the time, as I am sorry to say some of us do.

I have known some that would take days not lowery to play croquet, which, if spent in hauling something for the barnyard or compost heap, I apprehend would be time far more profitably spent. Other places which need looking after, not only for the fertilizing value, but for the sanitary benefits, are the sink spout and privy. A load or two of muck placed where the water from the sink spout can be conducted on it and occasionally shoveled over, and some dry muck or road dust thrown in the privy every few days, will absorb all those foul odors which arise from those places and frequently prove a source of malarial infection. Many a case of malignant fever and diphtheria have been traced to these causes. You will find it will be time profitably spent.

There is another valuable material for bedding and the compost heap—the forest leaves. Anyone who has a good hard wood grove —maple is the best—after the leaves have fallen, can rake them in heaps and haul them to the barn. They make an excellent article to bed the stock with through the winter. I think they will neutralize the odors more than any kind of bedding before mentioned.

I know a farmer in Franklin Co. who had a very fine grove of maples; he kept the underbrush cleared away, and in the fall would rake the leaves in piles, usually in the hollows, throw a little dirt over them to keep the wind from blowing them away, and would let them lie there till the next summer. They would then be nearly decayed. He thought it better to use them this way than to haul them in the fall.

I want to bring out the experience of some of these farmers in the application of manure, and to do this will give some of mine. I have found it better, if I had 40 loads of manure, to apply it to two acres, giving each acre a medium amount of dressing, than to apply it all to one acre. My land is easy to cultivate, free from rocks and I can get over a larger piece than those who have to haul off a large lot of stones every time they wish to plow. A large amount of manure makes my grain and hay grow so stout it would lodge badly and there would be quite a loss.

I believe in applying as much manure as the crop will admit of and not lodge. Some lands will require more than others. I would apply 20 to 25 loads to the acre, then I would use superphosphate or some chemical fertilizer. Last spring I spread manure as evenly as I could over nearly two acres to plant to corn. I planted what I thought best to corn and the rest to beans. I put a small amount of superphosphate in the hill, about a small table spoonful, and planted my beans. I planted two rows without any superphosphate, one row on each side of the piece some three or four rows from the edge, so as to have as good land as there was. The result was those two rows were small and yellow all the season. I could see a difference in those rows as far I could see them; called the attention of my neighbors to it. When I pulled them I weighed the beans of a certain number of hills which had the superphosphate and the same number which had none. I found those which had the superphosphate were almost twice as heavy as those which had none, thus proving that it pays for me to use it.

Another mode of applying manures, which is finding favor with all those who have tried it, is spreading it in the fall. Plow the land, haul on the manure, spread it and harrow it in just as you would for a crop in the spring. This method has its advantages. Work is not as driving as it usually is in the spring; the weather is cool, so you can work your team and not worry it with the heat as is the case in the spring. The ground has received the benefit of

the manure by being saturated with the fall and spring rains, and the crop seems to take hold of fertilizing properties in the soil quicker than if not applied till spring. It is not near as much work to plant your corn as it is the old way of manuring in the hill. You will need to harrow your land in the spring to lighten up the soil. A wheel harrow seems to do this as effectually as anything I have used. Mark off the rows and drop in some superphosphate before dropping the corn. It is not more than half as much work to cover it as where the manure is put in the hill.

This is the way one farmer in our County raised, in 1880, 212 bushels of corn from two acres, reckoning 70 lbs. of ears to the bushel. He does not use any green manure. He has a barn cellar, keeps his hogs on his manure, uses a large amount of muck, which he hauls in the winter. He told me a short time since that he had 200 loads of manure for use this fall, and should prepare 7 acres for corn.

## AFTERNOON.

In the afternoon Prof. SANBORN repeated the lecture given at St. Albans Institute.

All the time not otherwise filled was devoted to discussions of the subjects under consideration and to the consideration of questions presented by the farmers present. Though a profitable feature of the Institute, no report of these discussions is here given.

## SECOND DAY.

The second day was under the auspices of the Central Grange and was devoted to public discussions of questions relating to the farm, in both a scientific and practical aspect, presented by farmers present.

With thanks for courtesies extended and hospitality enjoyed the meeting was declared adjourned.

## WALDO COUNTY.

### Institute at Monroe.

An Institute was held at Monroe, November 8, in the Town Hall, which was kindly tendered for the purpose. In the absence of the member from the County Secretary Gilbert presided, opening the exercises in an informal manner and introducing for consideration some of the vital points bearing on the farming of the locality. The forenoon was devoted to a general discussion of the topics introduced.

### AFTERNOON.

Sec. Gilbert: It is proposed this afternoon to consider the subject of feeding as against selling hay. Recently this practice of selling off a large part of the hay crop has increased to an alarming extent. The means of transportation have been such that the practice has gradually worked back into the interior of the State, and from that to the remoter sections. Waldo County being favorably located, having easy communication with tide waters, cheap transportation, easy connection with a good market for the hay crop, the business has expanded in this county, and last year I think I have seen it stated that over 12,000 tons of hay were shipped from the farms of Waldo County.

Now anyone who has had his eyes open to this business and has weighed its effect in those communities where the practice has prevailed to the greatest extent, and realized, as there made manifest, the temptation that farmers are led to of selling the product off without replacing it in some form with purchased material, either as a fertilizer or as feed, and has seen the marked effect of this practice upon the productiveness of those localities and also on the condition and standing of the farming communities where it has been practiced the most, must look upon this with something of alarm, especially in a section where it has prevailed to the extent that it has in Waldo County. Hence I have secured a lecturer upon the subject of feeding as against the selling of the hay crop, and I hope he will have your careful and most thoughtful attention.

## FEEDING VERSUS SELLING HAY.

By T. S. Gold, Secretary of the Connecticut Board of Agriculture.

*Ladies and Gentlemen:* I trust that in the few remarks that I have prepared here upon the subject of feeding against selling hay I shall present the subject in such a candid, simple, plain manner that it will commend itself to your consideration.

The productive power of land varies in every degree from a fertility that endures the most exhaustive cropping for centuries to that which is naturally utterly barren. While the lack or excess of water or the presence of some properties poisonous to plants are the common causes of this last condition, yet when we find lands once possessed of a fair degree of fertility gradually losing this quality and for a term of years averaging less and less, we very justly attribute this change to exhaustion of the soil, to the removal of some of those elements necessary for the growth of plants, possibly to some changes in its physical condition. We have referred to those fields which exceptionally will bear continued cropping with no diminution of products. Different causes may operate to secure this end. There may be alluvial bottoms with a soil formed from the sediment of streams, which, even after these streams have ceased to furnish any addition, may yet for an indefinite period produce undiminished crops. Cases are more common where we can trace such continued productiveness to the annual overflow of streams or other local causes. Sometimes soft rock easily decomposing furnishes the mineral elements in abundance as fast as they can be absorbed by growing crops. But these cases are exceptionally rare. Here the crops may be annually removed yet with no diminution of products. This product may be sold, or it may be consumed upon the farm and the resulting manure applied to other portions. Good land and good farming allow of the sale of a certain part of the products, while the fertility of the farm is maintained. Land that is so hungry as to need a supply of manure beyond its own product must be classed as poor land and can have little inherent agricultural value, being dependent upon the facilities of obtaining this foreign supply. Sometimes such hungry land lying contiguous to rivers or the ocean may be fed from their waste with advantage, or it may be that proximity to large towns may furnish stable manure or other refuse for their refreshment.

Good farming is a management that is not only pecuniarily profitable for the time being, but does not do this at the expense of the productive capacity of the farm, but rather keeps it growing better and better. As a general rule farming must be independent, that is the farm must be in itself, of its own resources, self-sustaing of its fertility. With most agricultural land this is only true where the products sold from the farm are of the more advanced character, as animals or animal product.

There is but little land in New England that can stand the drain of selling hay or grain without some outside resources of fertility, either on the farm itself or from its vicinity. In these exceptional cases selling hay may be the best system to pursue, but in other cases it proves only a slow way of selling the farm, and its value deteriorates much faster than its fertility.

Two tons of hay per acre may furnish a good margin of profits, while only one ton per acre may entail a loss. That is, the labor of fencing, care, harvesting the crop which yields but one ton per acre may be as great or greater than the crop is worth, and in the other case the greater product costing but little more to harvest, and some times even less, by its greater yield is a paying crop. Up to the limits of a full crop, the percentage of profit increases faster than the yield. Money may be expended on a pampered animal or crop—that is lost—the last few pounds of flesh or bushels of grain being obtained at a cost far above the average and with little corresponding increase in quality, but these are only extreme cases. Such instances of overfeeding our crops or animals are rare—their diseases are not of that kind—they do not die that way.

Thousands of dollars are wasted on unprofitable *poor crops* or *animals* to one expended on unprofitable *good* crops or animals. The losses from poor, shiftless farming by far exceed the losses from high farming. The amount of mineral matter or ash contained in hay varies considerably according to the degree of maturity, species of plants, &c., but according to numerous analyses varies from .03 per cent. and a fraction to over .07. Taking about the medium .05 we have removed from the soil five pounds of mineral matter for every hundred pounds of hay, or one hundred pounds for every ton. This comes from the soil. It can be got nowhere else and consists of potash, soda, lime, phosphoric acid, silica, &c. The soil furnishes material from the slow decomposition of its minerals, coarse and fine. Our rocks and sands contain them in varying pro-

portions. When taken up by vegetation and this is allowed to decay where it grew, or returned again in the shape of manure, there will be a gradual increase of store of this mineral matter, for that contained in the vegetation will be again given back in addition to the natural supply. As most of the other elements, as carbon and nitrogen that enter into vegetable life and in some degree probably all of them, come from the air and water, we see how necessary it is to keep a ready supply of the mineral part of plants.

If we feed our grass to animals, more of this mineral matter goes off in the latter, very little in the cheese, none in mature fattening cattle, but more in milk and in growing animals, but if we sell grain or hay still more goes from the farm; it is a heavy drain.

The best farming (which also with certain limitations is the most profitable) provides that every field and every crop shall yield to its full capacity, even providing in good degree for bad seasons, for we notice that the best lands well cared for, either in grass or cultivated crops vary less in product in different years than neglected fields, thus giving good crops when they are most wanted and when they bring the highest prices.

It is clear from what has been said that removing the crops, hay or grain, from the farm tends to its deterioration, to make the succeeding crop less, and, of course, the percentage of profit less, other things, of course, being equal. The decline may be very slow, but it is sure, and if ten per cent. represents the margin of profits with a new field, it would not be a very rapid deterioration for it to become less than .01 per cent. or even nothing at all, not paying expenses, as I am sorry to be obliged to admit, at present is the case in regard to many fields in New England. One of the great leaks of New England farming is in mowing or cultivating these uprofitable fields. They may be too wet or too dry, too rough or too steep hillside, or poverty smitten or weed infested. But these are by no means past hope. Drainage, irrigation, amelioration of the soil by amendments or green crops, clearing off stones and bushes, thorough culture, and a fair application of manure will revive almost any land we have. Bad husbandry may have allowed many farms to run down, but there is little real exhaustion of the soil. It still contains the elements of fertility, though that needed for immediate use may be wanting.

The examples of successful husbandry in restoring the fertility of neglected fields and farms all over New England are too numerous

to bring this statement into question. Nothing is more astonishing than the results of good farming, as shown by these examples. This has never been done by over-cropping, diminishing the fertility, selling off all the produce, but by amending its physical condition by feeding the land and thus developing its hidden resources. We are not sorry to see these good farmers add field to field, to extend their possessions, for the prosperity of the country is thus enhanced.

It may be better for a township that its hundred farmers should each farm well and make their farms more productive from year to year, than that ten only should do this and have absorbed the whole territory of the township, but if the land is thus better handled, made to produce more food for man and beast at less cost, who can object to this absorption?

There are a great many circumstances to be considered in the question before us. If it is not good farming to sell hay, the converse of this proposition (that it is good farming to buy hay) may not be true. Hay is a bulky commodity, troublesome and wasteful in transportation, and bought or sold, this detracts from the profit of both seller and buyer. That our cities and villages must have hay is evident, and the supply must come from the farms, but whether it should come from one individual farm is the vital question for our decision.

It seems easy to figure out a greater profit from selling hay than from feeding the same on our farms—the advance in value of the stock from fall to spring, that have eaten the hay, seems a poor compensation for the value consumed, so that to sell the stock off the farm in autumn, and to buy again in the spring, having in the meantime marketed the hay, would seem to be a ready way of escape from the heavy burdens imposed by our long and severe winters. But trade is not the regular business of the farmer, it is only incidental to his calling, and the average farmer who does the least is best off. Allured by some good bargain, the purchase of farm stock or crops to sell again, has been the ruin of multitudes. Who cannot recall farmers who have been ruined by speculation in tobacco, hops or wool? True, these are favorite articles for speculation, and the temptation is strong—yet they eat nothing and neither the seller or buyer may be enriched. The case of horse-trading is still more enticing and few have steadiness of judgment to safely embark in it. Movable capital in the hands of the farmer is extremely liable to be

lost—especially if one successful hit, like a lottery ticket, encourages future ventures.

But does not this apparent greater profit in selling hay arise from bad management elsewhere or the neglect of good opportunities rather than from the benefit gained in selling hay? Hay and grain fed to good cows return a fair profit all along. Take a cow yielding twenty quarts per day at four cents per quart, 80 cents per day.

| | | |
|---|---|---|
| For the six months of winter, 182 days | | $145 60 |
| Suppose only ten quarts per day | | 72 80 |
| Two tons of hay at $10 | $20 00 | |
| Meal, 20 cts per day | 36 40 | |
| Labor above manure, 26 weeks, 50 cts per week | 13 00 | |
| | 69 40 | |
| Reduction in value of cows, &c | 3 40 | |
| | | $72 80 |

Leaving your hay on the ordinary or poor cow, sold at $10 per ton, but fed to the extra good cow, allowing $16.20 for extras, and you have the hay sold at $30 per ton. Suppose you made butter. A meal-fed good cow should make a pound from each ten quarts of milk, and you should aim to make butter, now worth 40 cents, as many exceed that price at present. These figures are not extravagant. They are more than matched every day in good farm practice.

A friend of an agricultural turn and some leisure, living in a city, bought a good farrow cow in the fall, bought his hay and provender for her keep, used all the milk needed in a family of ten persons, sold milk enough to pay for the fodder and sold the cow in the spring at an advance on the fall price. He used his agricultural knowledge to good advantage and was actually benefitted by the labor in caring for the cow besides the money profit.

Proximity to market must be one of the favorite conditions for the sale of hay. The expenses of baling and transportation interfere with the business when far from market.

The ideal farm furnishes food for stock the whole year, something to market each month and continuous employment for the farm laborers on the farm, not only of strong adult men, but as well of boys and the infirm.

The proper employment, the utilization of labor, and not the getting along without it, should be the object. The farm is the place where all the odds and ends of life are to be provided for and where

specialties in agriculture are advocated, this idea is largely thrown out of view. The more advanced an article is, the more labor expended on it, the greater should be the return.

It was the policy of England to keep her colonies dependent by encouraging the production of the raw products of agriculture, reserving to herself the profits from their manufacture. Thus the sale of hay saves all the labor—that is, stops it; the labor depends upon its feeding, making beef, wool and mutton, milk, and still farther, butter and cheese.

Common fruits grow abundantly in good seasons, yet the profit of the cultivator depends upon so applying labor to the crop that its quality may command sale at all times, and that a supply shall be furnished even in barren years. So of all other crops. It is the judicious application of labor to the soil that best rewards the farmer, and not the spontaneous fruits of the earth. These afford but a precarious supply.

There are few farms that can be devoted exclusively, or nearly so, to the growth of grass for hay, and still farther of a quality fit for market. A certain amount of stock will be always required, as much of the land will lie waste, much stuff be wasted that *should* be eaten. As where the whole farm is devoted to orcharding there must be great waste from the fallen fruit, but with mixed husbandry the sheep, swine, cattle and horses will utilize this otherwise utter waste, even to the benefit of future fruit crops.

The flow of water in a pipe depends upon the size of the smallest section of that pipe; the ability of a team to take a load over a certain road is limited by the grade of the steepest hill, or the depth of the deepest slough. Enlarge the one or improve the grade of the other, and you utilize all the rest of the larger pipe, all the strength of the team on the whole road.

Thus the capacity of a farm for keeping stock is limited to the pasturage or fodder furnished at the least degree, at the closest pinch for labor, to the power of the men and teams at the busiest season, and if you cut down the pasturage for the month that is the lowest you bring all the rest down to that. If you have a farm well balanced, keeping 20 head of stock and sell hay so that you can winter only 10 head well, you virtually reduce the stock-keeping power of your farm one-half, or in a greater or less degree as you sell hay.

So with regard to labor of men and teams. It will cost relatively more when employed only a small part of the year cutting and selling the hay, than where, by feeding the same, employment is furnished to the hired laborer the whole year; and still more is this true where the farmer and his family perform a large share of the labor. While I would not increase their burdens, I do not look upon toil as an unmitigated evil. Industrious habits in children are worth more to them towards success in life, than the value of their labor to their employer, and many a successful man has to bless the necessities of his youth which forced him to patient toil. So I say by all means utilize labor and thus save it, not withhold it in a vain effort to save it.

There are many plain cases where it is evident that hay may be sold. Every farm should raise a surplus to guard against any bad season that would otherwise require sale of stock at ruinous rates. It is allowable and good economy from time to time to dispose of this surplus whenever it is clearly safe to do so.

A farm or field may lie so near a large town as prospectively to be demanded for building purposes, highways, &c., so as to justify its depletion as fast as possible; and next to taking off the turf and selling that, is taking off the hay and making no returns.

There are farms a little more remote that can all be laid down to grass, with surface fit for the mowing machine, from which hay can be sold and the fertility maintained by returning city manure. This is a legitimate trade. The farm is not robbed, and probably more money is saved than if it was fed to make beef, butter or cheese.

Again, many farms have intervale meadows annually overflowed, that produce an abundance of coarse hay fit for cattle, but not for market. This hay fed out on the farm will make manure to keep the uplands in good heart, and their better produce may profitably be sold if the market is convenient. Where it is not favorable and these resources are husbanded, we see the benefits in the gradually increasing fertility of the uplands.

Near the sea the salt meadows furnish a tolerable fodder for the cattle and a great resource for manure. I have seen cases where alone has selling off the hay tested the value of improvements, which otherwise we should have classed as extravagancies. One extreme case will suffice as an example.

On an old rough farm in Connecticut, fifteen miles from market where they sell considerable hay, was a low-lying piece of one acre,

that had for a long time received the wash from adjoining fields, yet was so rough and wet that its produce, poor in quality, cut with a scythe, was only about sufficient to pay for the labor of harvesting. But still it had to be fenced and travelled around or over just the same as if it was productive of income. In the early years of the war, but not till labor had advanced in price, it was drained, cleared of rocks, subdued and seeded down to grass at an expense of $400 per acre. Yet on this sum it paid over 10 per cent. the next season with a fair prospect of yielding a good income permanently. The first crop of grass was two tons, sold in New Haven at $35 per ton, making $70 for one crop. Forty dollars of this gives the 10 per cent., and the $35 more than paid for the labor of securing the crop and marketing. I saw the field in September, and it had a crop of rowen, or second crop, estimated at over one ton, either fit for cutting or to be fed off. Can one object to the sale of hay from such a field?

The farmer who will make such improvements is a safe man to trust that he will not skin his farm and leave only its bare bones to his children. The ready reply from the boy, which I received to my foolish question as to what they were going to do with a huge pile of stones which had been gathered from the fields, more than they could use for walls, showed too that the next generation had wit enough to be trusted with the inheritance. "What are you going to do with that pile of stones?" "We are going to burn them, sir, when they get dry enough."

With such opportunities for the successful application of labor all about us in every neighborhood, if not on every farm,—for who does not see them on other farms—why are we longing for those places where the produce is more nearly spontaneous, but where flood and drought, chinch-bugs and grasshoppers come in to equalize advantages, if they do not cut down the results so that the average is in favor of the tiller of the soil in the supposed less favored positions?

New England farming to-day is suffering more for the want of labor applied than from any other single cause, and as selling hay has, as one of its favoring arguments, the saving of labor, this in its full growth is against the practice, for it is apt to run through all the farm operations, and farm improvements of every kind are discarded in answer to this call—"save labor."

But few farms comparatively possess these fore-named advantages for selling hay. Take an inland, upland township with none

of these foreign advantages of fertilization and continue the business of selling the hay as the main crop for twenty-five or fifty years, and where would be your farms and farming and farmers?

Another generation would possess the land, what was left, but not home-grown. With the gradual deterioration of the land the native population would diminish. The results of poor husbandry are always thus, whether the farm is skinned by selling its hay and grain, or whether neglect has allowed weeds and bushes to usurp the place of useful plants, or the imperfect culture of uncongenial crops has resulted in poor harvests.

Population will not stay or increase where it does not find remunerative employment, and where this is furnished by the soil to its owners, or by them to laborers or to artisans in the shop, there is a self-supporting population, upon which depends the wealth and strength of the state; there we find the elements of true and enduring prosperity.

A ride of a hundred miles through a country where no second growth timber is seen fit to cut, but some empty barns and deserted houses already appear, suggests that even in so newly a settled state as Maine the process of depletion has begun, and that intelligent and persistent efforts should be made to stay this suicidal course of management. It is the fault of American agriculture that it is drawing too much on the past and looking too little to the future.

God has given us this earth with command to till and dress it, and should we not use our heritage, that little portion entrusted to us, so that it may better sustain those who shall come after us, rather than that it must become a desert again, waiting for the recuperative powers of nature which slowly though surely will restore its virgin fertility.

## Discussion.

Sec. Gilbert: An allusion was made by the speaker to the non-employment of labor as connected with the practice of selling hay, certainly a most important consideration as bearing upon the general subject, and upon the community at large, and also as bearing more directly upon the individual's income from his farm.

I visited the owner of a valuable farm in this county, a man of means, who had stored in his barn seventy-five tons of hay. He kept upon that farm one family cow and one horse. He employed

laborers in cutting and housing the crop of hay, and after that his help was all discharged, and he himself was all the representative of labor there was upon that valuable farm.

Now, then, aside from the bearing of this upon the fertility of the farm, do such practices encourage and build up the prosperity of the community? What is its effect on the community? What a blasting effect would it have upon a town to have that practice extended over it. Would you call it prosperity? Would you build up the town in all of its interests—in any of its interests? Would your population multiply? Would your wealth increase? Would your reputation as a prosperous community be extended? Certainly not.

Let us look at it further. This seventy-five tons of hay represented the entire product of that farm—the entire income from that farm. The average value of hay at the barns of farmers, one year with another, is probably not more than ten dollars per ton. Seventy-five tons of hay at ten dollars per ton represented a valuation of $750, and that was the gross receipts of a farm worth to its owner $3,000 or $4,000. Out of that $750 what little labor he employed must be paid, the taxes on the property must be paid, the family supported out of it, the demands of society met out of it. All of the expenses must be met out of that $750. Would a man with a family in any respectable standing in the community, with only that for an income have much left to lay by towards his bank account? I think you agree with me that he would not, that there must be a greater gross income from the farm in order to secure and build up a respectable property. But this method is adopted for the saving of labor, which this gentleman has spoken to you about. I was glad to see that point presented, for it is one of the errors that seem to prevail among us, *that a saving of labor is a desideratum among farmers.* This error is working evil in many directions. We should never lose sight of the fact, that, provided we are able to make our labor pay its way and pay a profit on the enterprise, the more labor we employ on the farm the greater the profits. No manufacturer ever built up a fortune on the employment of one laborer, or on the employment of his own hands alone. It is the employment of many laborers and in the accumulated profits of those many laborers that he builds up his income. It is precisely so in farming. The farmer is a manufacturer, only we give him the name of the producer; and the more labor he employs,

the more hands he employs on his farm, the greater are his profits; and it will hold good every time, just so long as he makes his labor profitable. Where he is securing only a gross income of $750 on a $4,000 farm, by the employment of teams and laborers, and multiplying those laborers up to two, three, four or five, according to his business, he makes a profit on each one of his teams and on each one of his laborers, and out of a gross income of $1,500 or $2,000, which he can easily secure by the employment of these teams and this labor, he would have left as his profit a very much larger sum than he would have by simply selling the one clean product of hay and hay alone.

Now, again, is there a farmer in Waldo County who cannot make a crop of good hay bring him as much, fed out to good stock, as he can obtain when sold as a raw product?

E. C. RITCHIE: Perhaps we would go on the principle that a bird in the hand is worth two in the bush.

Sec. GILBERT: That principle will not always answer for us to work upon. If a farmer or a manufacturer is to carry on business he has got to look forward somewhat to the bush and not always to only what he has in hand; he has got to spread himself out, reach forward and build up and renew if he would establish, maintain and carry on a business. When he does that, any of these men who are shrewd enough to get a good profit out of a crop of hay are abundantly able to get a better profit by feeding it to a good stock.

There is this one matter, of the resulting manures from the practice of feeding out the hay, which we must never lose sight of. There is a value which many times is overlooked, which is realized, and yet which we cannot afford to let pass without notice. Sooner or later does this draft show its effect upon the soil; sooner or later does it drive you or your sons or the next generation to the city, to the West, or somewhere else off from the homestead. What we want is to build up and encourage enterprises in our own vicinity, employ labor, put as much labor into our farms as possible, at the same time taking care to make that labor profitable, as we are all abundantly able; to extend our business, to expand our energies. Then shall we build up this industry of farming; then shall we leave the land better than we found it; then shall we add to our wealth, not only individually, but also as a community.

E. C. RITCHIE: How can a young man, without much capital, employ many hands in improving his farm, and pay them, and still labor, and have any time to devote to recreation and study?

Mr. GOLD: The gentleman, as he presents the question, confines it to one line, which Mr. Gilbert did not confine it to, and neither did I. He confines it to the line of the employment of labor in improvements upon the farm. I placed the proposition in employing labor upon the farm, and Mr. Gilbert did also. That embraces not only labor in improvements upon the farm, but in the better culture of the farm and in raising crops that will pay during the year; in the care of the orchards; in the care of the fences. That pays directly. There is nothing that pays so well as putting up your fences. You can hardly call it improvements to put them up. And also in securing your crops against theft, not by animals, but securing them against theft or crowding or oppression, or whatever you call it, by weeds. Does anything pay better than that? Don't plant a crop at halves with the weeds, giving them half the strength of the manure and half of the sunlight, and be obliged to say, "I have sowed all and got half the crop; I have plowed and planted and hoed, and after all the weeds have got the better of me, and they have got their half." Now the judicious employment of labor would secure the whole. We don't want any cultivating of farms at the halves with weeds. Judicious drainage upon many a field pays for itself the first summer. Then, in reply to the gentleman, we have only to say that there are numerous instances where the intelligent application of labor answers the question. It says, what has been done can be done; what man has done man can do; it is being done. I will not here specify particularly just how it is to be done; but if any man brings more intelligent skill to bear in the management of his farm he will have more time for reading, more time for study, more time for planning the operations of his farm than he will if he simply puts his shoulder to the wheel and attempts to do everything himself, and to save labor by doing it all in that way. There is no greater waste, in my opinion, than in attempting to raise these crops at the halves in the way I have spoken of, and as we are doing so often—crops at the halves in which the weeds have half, crops at the halves in which the marauding cattle take half, crops of fruit in which the withered boughs in the top of the apple trees prevent us from comfortably getting our half. I say our agricultural industry is carrying a burden in that direction that

would sink any commercial or manufacturing business clear down out of sight.

Mr. DYER: I would like to ask the gentleman if he believes in mixed farming.

Mr. GOLD: I believe in mixed farming in most localities. I believe in special farming in certain localities, and where they have special facilities for reaching a market.

Sec. GILBERT: Explain what you mean by special farming.

Mr. GOLD: By special farming I mean confining the farm to the culture, for instance, of onions as a special crop. I have in mind a place where the culture of onions as a specialty is made the business of the farm, and each year the crop is made of more and more importance and leads all others. The preparation of the soil and the whole course of proceedings on those farms is pursued with the object of making the onion crop the great paying crop. Potatoes, corn and grass are merely incidentals towards that object. And in that way that product becomes eminently profitable in favored localities. No mixed farming upon those lands could compare with it. Other men take the production of some fruit, and make the rest of the farming incidental and subservient to the development of the farm in that direction.

If you are going to follow the dairy business you must make that your special object; you must breed for the dairy and feed for that; the dairy must be the leading object on the farm, but, in connection with that, the various opportunities of the farm for different crops should be always kept in view; the opportunities to do something in the way of raising fruit for instance. If one plants his whole farm to fruit he can hardly avail himself, for instance, of stock to aid him in working up his waste; but with a very liberal amount of fruit, if he has got stock of various kinds, sheep, swine and cattle, the refuse fruit need not go to waste on his farm, and his crop of fruit in succeeding years may be vastly benefitted by feeding it to the stock.

Sheep husbandry is another department that furnishes a very promising field for the farmer to adopt as a leading specialty, depending upon the help he may have in his family in managing his farm, and the nature of his farm, the soil and its location. This is one of those special departments of husbandry that may be carried on as secondary and subservient, but it is usually more profitable when it is made a specialty and the farmer devotes himself to it as

the leading industry for the year. As far as money returns are concerned, specialties in farming result usually in larger profits.

But the one specialty of all others upon the farm should be the effort of the farmer to raise for his own use everything that its soil and climate are adapted to, which he can use to advantage in his family, and of the best quality. That should be the first specialty of every farmer. Let him go in with that as his main object in view, and to stop the profits of the middlemen, and he need not complain about their profits. Then there are different parts of every farm that are adapted to different purposes, so the farmer may very well have something to do the whole year round upon the farm. By the variety of crops that he cultivates, and the different interests that require his attention, such as the stock, the manures, the fences, &c., something of that kind to do continuously, and still have a little time on a rainy day for reading and study, as the gentleman very properly suggests, for I believe that a farmer who works with his own hands and back-bone only often neglects other particulars that are really of more practical value to him. I have seen many farmers who were physically disabled from labor, and yet were the best and most successful farmers in their whole neighborhoods, because they had a head and eye to the business, and managed it properly and efficiently. So while we believe in a farmer's taking hold with his own hands, and being able, willing and not afraid to put his hand to any task that may turn up, he should always have a little mental and physical power in reserve, so that if it is necessary to start and run a race at any time he will feel like it. His boys, too, should be brought up in the same way. I don't believe in working boys so that they will not enjoy a good run. This is what I mean by special farming.

Sec. GILBERT: I would like to carry out this line of thought somewhat further. You speak of dairying as a specialty, and of sheep as a specialty. What have you to say to these farmers in regard to the ability, under good management, to secure the market value of the hay crop by feeding to sheep and dairy stock?

Mr. GOLD: There are various ways of conducting sheep husbandry which I have seen that seem to me to be extremely profitable. One is to keep a choice flock for breeding purposes, and selling their produce. The figures obtained from those men who are following this are such as to convince me that under favorable circumstances sheep culture is a profitable method of disposing of the

fodder of the farm. A more profitable way still, for those who are favorably situated to conduct the operation, seems to be in purchasing at this season of the year a flock of breeding ewes from Canada, or the northern stock as it comes into Connecticut and Massachusetts, of large size, and feeding them during the winter with more than ordinary liberality, with grain as well as hay, and securing an early crop of lambs that shall also be fed to their full capacity, and shipping them in June or the first of July, when they will have attained a good size and will bring the very highest price in the market. Those ewes will have become very well fattened, and will go to the butcher during the same season at an advance perhaps of two dollars upon the original cost. The lambs will have brought you five dollars a head; your wool will have brought you from one to two dollars. There is eight dollars that can be counted on as the fair receipts of those ewes, and it may be extended to ten dollars without a very great strain, in the matter of twin lambs and the increased price which some might get over the figures named; making ten dollars as the income from each ewe purchased. In addition to that you have a valuable amount of manure. The scientific writers upon this subject, you know, will make out that the value of the manure from a ton of clover hay is in some cases worth more than the hay was before it was fed. There is where you are going to get around that question about your phosphate. If you will feed your clover and your hay, you will not be so dependent upon the New York dealers for your phosphates; you will then keep your own phosphate at home, which is better than depending on the manufacturer for it. And in this matter of feeding sheep with grain, you will consider that the resulting phosphate may be deposited directly upon your own fields, and just in that peculiar "progressed" form which Prof. Mapes makes so much of. He claims that these substances are a great deal more valuable, in the droppings of animals, than in any other manures in which we may find them. That is disputed by scientists, but that is his opinion. Prof. Mapes is not always correct, but I had rather have my manures in the barn-yard than in a barrel or in my coat pocket; I think they are more valuable in our ordinary methods of husbandry. I don't go to the full extent in these things that some do, in the belief it is better to have your manure in such form that you can sprinkle it with your hands.

And now if you get ten dollars from a sheep—and six of these large sheep will eat as much as a cow—for six sheep you want two tons of hay for the winter, besides your other feed. Thus you are going to have a good price for your hay in that way, without taking into account that this manure is going to enable you to grow larger and larger crops every year instead of less and less, as the other system surely leads to. It doesn't show itself necessarily in one, two or three years, but just as sure as water runs down hill, just as sure as by continually taking out of the bag you will eventually get to the bottom, just so sure it is that selling hay will diminish the productiveness of the land. There is no getting around that proposition and its converse at all, as numerous examples everywhere plainly show.

Mr. SHAW: If I have got a correct idea of the gentleman's remarks he has given us what they do in Connecticut with their sheep. Now the question arises in my mind, can we do that here.

Mr. DYER: I know of but one individual in the East who has tried that method, and that is Mr. Ritchie of Hampden, well known to most of you. He used to go up river in company with another man and buy quite a quantity of sheep and put them upon his farm in Hampden, and keep them penned, and feed them generously on hay and grain. Yet he told me that he failed to make them gain in weight during the winter; but he did well and made money, however, because he dressed his sheep and sent them to Boston. He also built up his farm from the dressing. As you all understand, sheep are mountainous animals naturally, and when penned in our barns they do not thrive.

Mr. GOLD: In answer to one remark, that the sheep is an animal that will only thrive when it has its liberty to range, I saw such a complete refutation of that statement at the agricultural college in Ontario, a few months ago that I will relate it here. That institution, which is at Guelph, has one or two hundred students. Some of the choicest stock of England, both cattle and sheep, is carried there and kept under the management of the superintendent of the cattle. We saw there some sheep that were fattening for the next Chicago fat show. They took the prize a year ago, over all the United States, for their sheep shown at the fat stock show in Chicago, and he was confident they would do it again this year. Those sheep were not out of the folds. They were in a large, airy basement of the building. Those sheep had been in there for six or

eight months, and they were to stay in there till they go to Chicago this winter. They were excessively fat in June when we were there. We asked about the advantages of such a course, and were assured by Mr. Brown that that was the way to fatten sheep, and that he would defy all competition in the United States in the production of his mutton.

In regard to having seen this method of feeding sheep pursued in Connecticut; I have been more familiar with it as followed in New Jersey, where their facilities for getting grain are a little better than ours, and their facilities for getting to market a little better than ours, and I have seen it followed there with still more success than I have in Connecticut. And I believe it is within the reach of any farmer in any location, who understands how to take care of sheep, and how to keep them in health even in an enclosure, in that way to make it pay, both on the sheep and on the fertilizers that they leave.

Mr. DYER: I would like to ask if those sheep were not fat when they went in there, and if it is profitable to feed sheep the way they were for two months to sell for mutton.

Mr. GOLD: We didn't consider that it was a profitable proceeding for Mr. Brown, in a pecuniary view, to keep them over a year, with all the grain and roots they would consume, and green grass in summer. but Mr. Brown had this object in view, that I have spoken of. He was fattening bullocks for the Smithfield show in England to make that agricultural college stand up before the farmers of Ontario as a success; and he wanted to take the prize at Chicago on his fat sheep. Stock breeding is a prominent business in Ontario, and he wanted to show them that they could take the prize anywhere. He wanted to fatten the bullocks, and he knew how to do it, so when they were presented in the Smithfield market they would make the Englishmen look around and want to know where they came from, and they would find they came from Ontario. Wasn't that worth anything to the province of Ontario, to be able to show over there these bullocks, fattened that way, and made ripe, as we say, to a most perfect degree as fat bullocks? That was Mr. Brown's object, not to just fat up something that would be the most profitable to sell to the butchers. He collected the most perfect animals he could find of their breeds, and then developed them to the highest degree he was able, with all his college ideas. The government of Ontario furnished them with stock to breed from, choice imported animals from England and Scotland for them to work with, and they calculated to make good use of them.

Sec. GILBERT: Upon this question of feeding we have had some experience in our State, and I will refer to the business in the localities where it has been practiced to the largest extent. You are aware that sheep husbandry is an important business in Somerset county and in a large part of Franklin county, and is extending over into adjoining counties. There the practice prevails to a considerable extent of feeding sheep for the purpose of turning their hay crop into cash, and at the same time retaining the fertilizing material on their farms. Thus far they are meeting with very good success, taking such sheep as are fitted for the purpose from their own stock, and going into other sections of Maine and into Canada and purchasing such as they want, and taking them home upon their farms and feeding them from the fall up till the later winter market will give a satisfactory price. In that practice, like the experience referred to in the town of Hampden, they do not succeed in adding any great weight to the carcass of the animal. Their profit chiefly comes from these two sources—the increase in the weight of the fleece and the increased price of the carcass by the rise in the market. They consider that they have done a satisfactory business when their sheep "hold their own," as the saying is; but the increase of price and the increase of wool usually gives them full and complete cash returns for the market value of the hay and grain fed to the sheep. That a system of feeding could be introduced by which better results would be secured is by no means doubted.

Mr. GOLD: In fattening beef animals it is well known that taken up from the grass and put into the stable and fed with grain, it is a very considerable time before you gain anything in weight. It is not to the gain in live weight, but in the quality and in the less amount of shrinkage of the animal when slaughtered that they look for their profit.

Sec. GILBERT: Still more striking illustrations of sheep feeding are found in the Connecticut valley, upon those valuable grass lands up and down the Connecticut river where they are feeding sheep in still larger numbers. They go back into Northern Vermont and into Canada and buy sheep, and purchase largely of grain from the west, wheat bran, cotton-seed meal &c., to go with their hay, thus carrying the fertility of those fields to their own premises, and getting a profit on the operation, building up the fertility of the farm, and turning the crops into cash at a good price.

Mr. F. W. RITCHIE of Winterport: I rise to make a few remarks upon the subject of labor upon the farm. My labor is hired labor. I have had good labor and my success has been built up on this labor, yet no one can say that I have crowded my laborers or that one ever left me for that reason.

There was a gentleman at my house not long since who was discouraged on farming somewhat. I told him that farmers didn't go in to make it pay. Said I, "we plod along in the old ruts and think we must not employ any labor because it don't pay. Now," said I, "when I employ two men—and I do so most of the time—my profits are greater than when I only have one. I am satisfied that that is the way to make the most progress in wealth on our farms." You all know that my farm has increased in its value, in its fertility and in the value of the buildings, and it has all been done by hired labor, except what has been done by myself.

One of these gentlemen made a remark about teams. You see, brother farmers, how true it is, that if you keep a team to do your work, that same team will do the work where you have half a dozen men; you have to keep it for one man, and it costs just as much to keep it for one man as for half a dozen; so, you see, the more men you have the greater profit you have on your team.

I have sold considerable hay, but I always calculate to replace it; I keep hogs, and calculate to keep material for those hogs to work upon, to replace the fertility sold off in the hay; that is, the fertilizing material that I rob my farm of by selling this hay, I replace by keeping hogs and keeping material for them to work upon. Without some such provision, the selling of hay will reduce our farms. It costs just as much to have our teams pass over an acre of poor thin grass as over an acre of good English grass that cuts two tons to the acre. I consider an acre of my land, when it cuts two tons of hay, as equal to $200 in the bank at interest, and I consider it a good deal safer in my farm; but by robbing it of its fertilizing material we may reduce the hay in quantity and quality down to where it pays very little interest or none at all.

W. H. MOODY, of Liberty: Daniel Defoe says: "There is nothing so false as facts except figures," and here, I think, brother farmers, is where we fall into a great many errors. The gentleman who spoke to us so ably in the early part of this meeting, gave some figures, and if the facts would bear out the figures there is no doubt but there would be money saved by feeding hay or any other sub-

stance to the cows. Taking those figures as to the amount of milk that the cow gives and the price at which it will sell, it is a very easy matter to see that dairying would pay us as well, if not better, than anything else that we could take hold of; but, unfortunately for us, the facts do not bear out the figures. While it might be possible, perhaps, to get that amount from a cow, it is impossible to get four cents a quart for milk, in this county at any rate. I have lived in an adjoining town which has had two cheese factories, both of which are now idle. There milk brought from $7\frac{1}{2}$ to 12 cents a gallon in cheese. If you come to take that price for milk you will find very different results, when you come to make the figures, from what you will if you take 16 cents a gallon. We are very apt to get our figures too large. We do not realize our anticipations. When you get near the large cities perhaps you can safely reckon on that amount of milk and the price, but back here in this county you cannot realize anything like those prices; so we have to look the figures over very carefully when we talk about dairying in the State of Maine. It is true that when butter is twenty-five cents a pound, the cow will pay pretty well if you make butter, but, unfortunately for us, there is quite a large portion of the time when we cannot realize that price. So when you talk of dairying in this county you have got to talk with figures somewhat reduced.

The same is true with regard to the feeding of hay. If you take the figures of agricultural writers and scientists you can make your hay pay you by feeding it to stock and sheep, if you credit enough as the value of the manure left. But if you return this to the soil, what does it bring you back? You will find that it brings you back a very much smaller amount than was credited for it. So if you look at results, they are smaller always than you anticipate. Therefore if you talk about feeding hay upon the farm, you must always reckon below your full figures, and then you will be disappointed.

It is true there is a large amount of hay sold from the county of Waldo; and it has been done for years; and if the farm is stripped of its hay—if a man takes all the hay he has from his farm and sells it—the result can be foreseen from the start; it is only a question of time. But we don't do this. There is much land that will bear good timothy hay year after year. I have been told by those who occupy these lands that for a succession of twenty years they will produce a good crop of hay. Perhaps that is an exception. But a man takes a certain portion of his hay and sells it and feeds

a portion at home, and so returns enough to the soil to keep up its fertility; year after year he replenishes his land sufficiently to produce a surplus of hay, and takes away that surplus. You see he has got money out of it. His team is kept upon the farm, so that the expense of marketing is very small. If a man has eight tons of hay to sell he gets a hundred dollars, ready money; and that goes a long way towards paying up these little bills that we have to meet. Still, with his mixed husbandry he has returned sufficient dressing to the soil to keep up its fertility; so that the practice has been found profitable.

I have lost a great deal of money by running after scientific principles as I was taught; and now when I find a gray-headed farmer who has been tilling this land for twenty years, I always take stock in what he tells me. He tells me he finds it profitable to sell a portion of the hay year after year. I know you gentlemen may say that what holds good on one ton holds good on a hundred, but I think I can see a difference. So I believe the system pursued in the county of Waldo, of selling a portion of the hay, is the most profitable of anything we can adopt at the present time.

Mr. Gold: Let me make one suggestion with reference to this gentleman's statement as to the price of milk. Milk to the cheese factory goes there in the summer season, when the cows are on grass, when milk can be produced the cheapest and when the returns from the cheese factory at 12 cents a gallon, or 3 cents a quart, are very satisfactory indeed. My statement of 4 cents a quart was based upon the opinion that to-day that is as low as the average selling price, and lower than the average selling price of all the milk that is sold in New England and New York City. The New York wholesale price is 4 cents a quart, and they grind us under the mill stone there as badly as anywhere, and the Boston price I believe is about the same. The price in our local markets is a good deal better than that. I think I have not overestimated the yield or the price.

Under the present system which is being introduced, of making butter in the winter, in the factory, to supply the demand for fresh made butter in the cities, the price that I have given for butter is fully sustained. I did not mean in making my figures to confine them to what farmers, with all their negligent habits, are actually doing now, but to place them at what we all, with a good fair average ability, might do and should do. And I believe my figures in

regard to the price of milk, winter milk, you understand, can be sustained. The price I allow for grain at the present time is ample to give a liberal feed to your cows that will give you milk that is worth, even to make into cheese, more than the grass milk of summer. So I think the gentleman's objections to the figures cannot be maintained. I believe they were made with such moderation that they will stand. I meant to make them with extreme moderation. I have known these results to be far exceeded in actual practice; and I believe they are safe figures to steer by, to aim for, and to work upon. The difference between the cost of winter milk and summer milk is very great. You can make milk on grass at a profit at two cents, where you would have to get four in winter.

Mr. MOODY: Here in winter our milk brings us far less than in summer. The winter butter brings less, except in the cases of a few men who have regular customers to whom they carry it every week. Down here I think we can say that our milk is not worth more than three cents a quart generally.

Mr. GOLD: I am aware of the poor quality of your winter made butter when made from poorly fed cows, and I have no doubt that is very unprofitable butter; but there is a good demand now in our markets, that is not met by any means, for winter made butter from grain fed cows. That is commanding the prices that I mentioned right along, and sells rapidly, while common, cheap butter goes begging for a market.

Sec. GILBERT: I fear the gentleman from Liberty is underestimating one of two things, and I will leave you to take either horn you please; one is the advantages of Waldo County, and the other is the intelligence and ability of her farmers.

I maintain that right here in this neighborhood, within easy reach of this cheese factory, every farmer may get the cash value for every pound of feed he gives to his cows in the cash receipts from his dairy products. This is easily proved. If you are not doing that—and I know nothing about whether you are—either you have not secured good cows and are laboring under that disadvantage, or else you are laboring under the worse condition of poor feeding.

I tried this forenoon to learn from the gentlemen present what they are obtaining as an average yield from their cows at this factory, bnt I do not get very definite facts with regard to it. I hope there are some farmers here carrying milk to that factory that know what they are receiving from their cows. If you do not, it is not

the business that is to blame but the individual, and the first thing to do is to go to keeping an account. I don't know whether you do it or not. I don't cast any reflections on you in regard to your practice, only I say that is a necessary precaution.

Now, what is the cost for keeping a cow right up to the mark for a year? With careful management and intelligent feeding you can't put more than $50 worth of feed through a cow in a year. If your skill and management do not return you $50 in product from a cow in a year, then I say give more strict attention to the business and see if you cannot obtain it. The fault is in yourself and not in the business. Your facilities as to market are not of a low character here in this county. You are within as easy reach of a market, and of as good a market as many other localities that are making this dairy business their special feature and building up their prosperity by it. You have good facilities here; you are well situated and you should avail yourselves of it. You can easily average your $50 from each cow, and many of you are doing it now. That being the case you are getting the cash value for your feed in that one business. This is being done in other localities and it can be here. The statement is moderate; it is entirely within reason, and it is entirely within practical results. When you go into fancy dairying the possibilities are far above that; but fancy dairying is not applicable to a whole community. Associated dairying is applicable to whole communities if they will but avail themselves of it. It is the application of careful business management and the looking after details and the keeping of figures that lead us to the apprehension of what is within our reach.

As a matter of fact allow me to say that here in this village, at your factory, cheese was made last season, which is now selling for a price which has not been reached by anything produced in New York or New England, outside of the State of Maine, this year.

Mr. SHAW: I would like to say a few words on this subject of dairying. It is a subject that I have given some thought and study to, and I think Mr. Gold's figures can be sustained. I have years before weighed each cow's milk, and knew just how many pounds of milk it took to make a pound of butter and what I realized from it; and I am satisfied that dairying will pay here; in fact I know it will, and when we cannot realize over $60 a year from a cow with good feed, it is time that we change her for one that we can get that from.

As a general thing a farmer can realize more money by putting his milk into the cheese factory through the hot weather than by making it into butter and selling it at the market price. There is now and then a man, like the gentleman here from Winterport, who has an opening where he can put in his butter and get a fancy price, but that is not what the farmers as a rule can figure on. I find in my own experience there is more profit in making butter in the winter than in the summer; in fact good fresh winter made butter I find will bring in the market, frequently, double what we get in June, July and August; and therefore I think dairying, if attended to, will pay. But if a man is going into dairying he has got to give it study and thought; it will not do to carry it on in a slip-shod manner; but he must give it careful attention, and try to produce the best butter that goes to market.

Mr. DYER, of Winterport: I have been referred to as getting a fancy price for butter. I have no advantages over any farmer who keeps good cows and who will give the business his time and attention—none whatever.

I wish to refer to the farm spoken of that cuts 75 tons of hay—what may be called a good farm down here in Maine. I will tell what I would advise that man to do. I would put 20 cows on to that place, and three young heifers and two horses, making some 25 head of cattle; and I would feed 50 tons of that hay to them, of the finest quality; I would sell 15 tons of the balance and put it into meal or some good feed for those cows, and the other 10 tons I would put into hiring a hand to help me take care of the cows. I should expect to receive $40 per cow, at least from them, and ought to have more. This would be $800 as the proceeds of the cows alone, and a little growth on the heifers. There would be a good pile of dressing, with which you would increase the hay crop the next year to 80 tons, and the next year to 85, and pretty soon you will be an independent man.

Sec. GILBERT: The subject under discussion this afternoon is certainly an important one, and it is hoped that the farmers in this county will carefully consider it. In doing this you will certainly be lead to a better understanding of the subject, however much consideration you have given it heretofore.

One word further, in closing, upon the subject of the employment of labor on the farm and the profits therefrom. The question was well raised, whether any man, in debt for instance, can employ

labor and realize a profit from it and still have some time for pleasure and study. Now this is a practical question, and one which has a bearing upon every young man especially, who is considering whether he shall remain on the paternal acres, emigrate to the west, or go to the city to try the hazardous chances of success there. Let me say here, that on a farm where the farmer is at the same time laborer and chore boy and manager, and the sum and substance of all the labor on the farm lies in his own powers alone, the grinding toil and never ending demands make a slave of him; and if he confines himself to such practice it is no wonder that he has no time left for the cultivation of his mind or for the study of his business whereby it may be promoted. To avoid this, by all means he should employ labor to assist him Making a profit on his labor, as he well can, enables him to give the more time to the study of his business, to leisure and to pleasure. No man can successfully manage a farm and be himself the only laborer and chore boy; he does not have that time to devote to the business transactions of the farm which will enable him to make it successful. Circulation among the people of the community is required of the man. He cannot build up that industry and make it successful by grinding labor right on his acres, with no mingling with the world. He must make of himself a business man to some extent,and to do that he must circulate among the farmers, and give attention to matters pertaining to his business. In order to do this you have got to employ labor, or else you grind yourself into insignificance.

## EVENING.

The evening session was opened with the reading of a paper by W. P. Atherton of Hallowell, on "Methods and Practices in Fruit Culture," which was repeated at the Knox County Institute.

After the reading of the paper the remainder of the evening was devoted to

### Discussion.

Mr. Gold: What do you know about the Fameuse, or Snow Apple, here in Maine?

Mr. Atherton: I omitted to mention that. From what I know of it, it is a very fine apple, one that I think can be highly recommended for general distribution and cultivation; it is one of the very best of fall apples in its season, which is November. I know

of nothing superior in flavor or in beauty. The tree is very hardy and thrifty and comes into bearing young. When it first comes into bearing I have known the fruit to be spotted and inferior, but as the tree grows older I think it outgrows that to some extent and generally bears fair fruit.

QUESTION: Do you think that variety meets the popular demand at the present time?

Mr. ATHERTON: I do. It is of no use to sell in a market where its true character and value are not known; you can't get any more for it than for an apple that isn't worth half as much.

Mr. GOLD: I have cultivated this apple for many years, and my boys, who naturally are looked to as judges of fruit, when asked along in the autumn what is the best apple of our one hundred varieties in the cellar, all stand by the Fameuse, and if they couldn't have but one kind would take that. It has a very tender flesh and you can eat it in the greatest abundance and it has a most healthful effect on the system. Last year, Mr. Barry, who is a sort of substitute president for Col. Wilder, volunteered the opinion that this was the leading apple of the country, the one of all others whose culture should be encouraged, and an apple of great excellence which was not getting its merits, because not fully known.

It is a perfectly hardy tree, favoring a northern and cold location rather than a southern one; the apple will keep till January very well, notwithstanding its tenderness and fitness for the table in October. If I was to have only two or three trees this would be one of them, for a family supply, by all means.

QUESTION: What kind of soil does that fruit grow the best on?

Mr. GOLD: Well, any good, warm, loamy soil that is adapted to corn is adapted to the apple; I have seen it spotted in some cases where I thought the soil was a little cold and wet, but generally it grows very fair, pretty fruit. That which is shipped from the West, especially from Michigan, is larger, but it lacks the flavor which it acquires here in New England. When shipped from Michigan it is picked a little too green, and then it is not a favorite here. A gentleman to-day was recommending the Black Oxford as the very best apple raised in Maine in his estimation. What is the general estimate of it?

Mr. RITCHIE: I believe the Black Oxford should not get a black eye here to-night. According to my experience it bears finely every other year, and in the latter part of May commands a large

price. They were the last apples I sold last year; the best keepers I raise.

In order to make a wise selection of trees we want to know what kind of soil each variety needs. Wherever you see yellow birch, rock maple, white ash and beech grow, there you may be sure the Baldwin will succeed, and I say the Baldwin is the standard apple for Waldo county. Last winter fifty per cent. of my Bellflowers rotted, while I didn't lose ten per cent. of my Baldwins.

We had better stick to the varieties that we have proved, rather than to try all these new varieties which are recommended to us by those who are not familiar with our soil and climate. I lost $500, I calculate, by following the advice of a gentleman who wrote in one of our agricultural papers, recommending the Ribstone Pippin as the best apple that we could raise. I grafted a large lot of my trees to that fruit and it proved an absolute failure. They would bear but little and then they would shed the fruit.

I do not believe in such a thing as odd years in apples. Last year my Baldwins loaded themselves down, and this year they did the same. They only want fertilizers to bear fruit every year.

Mr. ATHERTON: We must be pretty cautious what we say about fruit and the cultivation of it. Statements which are true generally are not always true locally, and statements which are true locally are not always true generally. The gentleman was unfortunate with his Ribstone Pippins. I know that to be a choice variety, and I know it does well in certain localities, bears well and holds its fruit well, but this is not the universal experience.

Sec. GILBERT: Do you consider it as reliable or profitable as the Baldwin?

Mr. ATHERTON: No, I would not recomend it at all; but they do finely in certain localities. Generally it is true that grafting the seedling in the limbs is the best way, but locally that may not be necessary. On my own farm I have nice Baldwin trees that were grafted in the stock, a certain distance from the ground, and they are as large and as healthy trees as I have on my farm. I have also some good Baldwin trees grafted in the limbs.

QUESTION: Do you consider it essential to our success that we search after new varieties?

Mr. ATHERTON: No, I do not; but some of the new varieties are very valuable and preferable to the old ones. I think the Gravenstein and the Fameuse are better than anything we have ever had, in their season.

Mr. SHAW: I would like to inquire of the merits of the Wealthy and the McIntosh Red for general cultivation.

Sec. GILBERT: I know something of them. The Wealthy is one of the new varieties that we have recently had our attention called to, and fortunately it is a good fruit. It is also one of the extremely hardy varieties, perfectly hardy in any locality in which we expect we can raise fruit. The quality of the fruit is good enough. The shape and style and general appearance of it is good. It is about the size of a medium Baldwin and is shaped and colored very much like the Fameuse. It keeps well into the winter, but whether as well as the Baldwin remains to be proved. How successful it may prove remains to be seen, because it has been but recently introduced among us, and in fact is of recent origin. It is being tested in my own grounds. It has fruited within my knowledge and has given good satisfaction.

The McIntosh Red, though an old fruit, is one of those varieties which we have had our attention recently called to. The tree is said to be hardy and vigorous, fruit handsome and of good quality, but is not recommended as a late keeper. We should be careful about planting it largely till we prove it to be better than varieties we are now growing.

I was glad to hear the remarks of the gentleman from Winterport, cautioning against making mistakes in the selection of varieties. Our orchardists have made a great many such mistakes. In the selection of varieties extreme care should be exercised. If you are not yourselves already posted in such things, by all means, before you set an orchard, take time and post yourselves, and be very careful whom you take for an authority; by all means don't take a nursery salesman. They are all the time recommending new varieties that are not well known, and hence are liable to lead you astray. Be extremely careful, and first post yourselves with regard to varieties, and thus avoid these mistakes, which take many years to develope themselves, and which give you, instead of valuable fruit, a good crop of disappointment. We have had too much of this. Fruit-raising is a profitable industry when intelligently followed. I was in hopes the speakers would dwell more on the profitableness of the business. We have had good examples of it in our own State lately, and the farmers who have made this a specialty are reaping a rich reward.

Mr. ELLIOT: I would like to inquire if the crab apple tree can be grafted to the larger fruit with success.

SEC. GILBERT: The effort to change the crab apple into the apple will not be successful. While you may secure crops of fruit for a limited time, failure will sooner or later follow. The habits of the two trees are so different that it must result in failure in the end. If you have a crab apple tree that has attained considerable size, you can make it grow apples for a short time and get some satisfaction out of it, and if you don't make too great calculation you may consider it profitable; but, as I said, destruction will sooner or later follow. Let me say here that if you wish to try it you will find better results from the insertion of a variety of slow growth and dwarfish habits. If you wish to secure the best results the trees had better be removed, root and branch, and good trees put in their places.

QUESTION: Will pears do well on round-wood?

ANSWER: They will "take," as we say, and grow, but they soon outgrow the stock the same as with crab apple trees, and break down.

QUESTION: In regard to the suggestion that was made this afternoon about keeping different kinds of stock to eat up the waste stuff, including the apples, I would like to ask what kind of stock they can be profitably fed to.

Mr. GOLD: Last year, early in the season, as soon as I saw I was going to have an abundant apple crop, I turned my swine into one orchard and kept the falling apples used up in that way. The swine grew finely, and so the result was satisfactory with regard to that. I put my sheep in another orchard, and the result was satisfactory there. There is no danger of sheep eating too many apples even if the ground is covered with them, and they thrive well on them. A peck, or half a bushel, every day through the autumn is a delicacy that they enjoy and that they thrive wonderfully on. There is no better or cheaper way of keeping them in health than by giving them a moderate supply of apples. Young cattle that have access to the orchard will not ordinarily eat enough to hurt themselves. With regard to the milch cows, there is another question. The cow is the most greedy animal we have; she will eat too much of any good thing, and above all she will eat too many apples if she can get a chance. If they can go in a few minutes each day and get some of the apples which have dropped from the trees, it

results in their thriving and increasing in their milk. But, still better than that, pick up all these imperfect apples and store them in the barn cellar and feed the cows a peck a day with their other feed. I believe that is a profitable use of the apples.

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## LINCOLN COUNTY INSTITUTE AT DAMARISCOTTA.

An Institute was held at Damariscotta, November 10th. In the forenoon the Lincoln County Agricultural Society held its annual meeting for the election of officers. The Institute was called to order at 2 o'clock in the afternoon by E. W. STETSON, the member from that county, who, after remarks explanatory of the intent of the institute, announced a paper on

### DAIRY STOCK;

By ERASTUS LERMUND, member from Knox County.

There will be no attempt in this paper to treat of scientific breeding; but, instead, to present in a general way the mismanagement of a large part of our dairy stock, and to suggest some improvement in and better care of such stock as we have or may select to meet our wants. There is no reason why Maine may not take an advanced position in dairy products. Our pastures produce good feed, our fields good hay, our climate is as good as the best, our lakes, rivers, brooks and springs furnish water unsurpassed, and also cheap ice for handling the products of the dairy in the hot weather of summer. Yet a majority of our farmers say there is not money enough in dairying to make it a profitable branch of farming. An opinion not very surprising under the present management. There are very few complaints from those who conduct their dairies properly.

Ask the owners of good cows if there is any profit in them, and they answer yes. Ask the owners of inferior cows the same question and the answer is a negative. And both sides are correct. Their conclusions are an indication of the quality of their stock, and should the owners exchange herds they would change opinions, for,

as a matter of fact, the cows tell their own story. To make the dairy pay, we should keep cows which will make profit possible. It is not possible to get a profit from a large percentage of the cows kept for the purpose. It is safe to say that of all the cows kept by farmers for dairy purposes, one half are worthless. What are the causes? Careless breeding and rearing, want of good care and food, which decreases the productive capacity of each succession, and the arguments to show that dairying don't pay, which have a tendency in that direction, by dampening the spirits and ambition of the dairyman.

It is a well known fact that we sell many of our best heifer calves to the butchers, because they bring a better price, and keep the scrubs to raise, vainly hoping they will make good cows. That cannot be, for continual selection of the best is the basis of all improvement, and if farmers will persist in taking the opposite course we shall have to feed and perpetuate a class of cows which are an expensive disgrace to the owner. It is better to follow some of the plainest laws of reproduction, than to dream year after year that we may by some chance get a good cow from inferior parentage.

Steer calves are well selected, well fed, and exhibited with honest pride; but the heifers take what they can get—hard fare and hard care—in fact, a mere struggle for existence. If it pays to use the steers well, surely it will pay better to treat the heifers well. By neglecting the heifers and cows, we not only degenerate them, but also the oxen, by raising inferior mothers. Some select stocky cows that are built like oxen from which to raise steers, and they also raise their heifers from the same cows, and of course dairying don't pay them. It is a mistake to select a cow which looks like an ox to raise oxen from. She ought to be large, but must have the build and characteristics of the female in order to have robust and thrifty calves. The best time to select a heifer calf is when it is two or three days old, as it indicates more plainly at that age what the cow will be than when older. In making the selection, great care should be taken to get the best without regard to size or color, unless fancy colors are sought; for calves which are small at birth often grow very rapidly. Look at the calf from different positions to get the general outlines. If it fills the eye, or looks like a miniature cow and is of a desirable form, then lay it upon its back and carefully examine the teats to see whether they are of good and

even size and stand well apart. If there are no defects, such as holes in the sides of them from which milk will escape, keep them.

Buy calves of farmers who keep good stock, or buy them in cities and villages where the cows have been selected from the country and have been well fed and cared for and therefore have become accustomed to give milk the greater part of the year, which quality they usually transmit to their offspring. Do not let the butchers have a good heifer calf. If calves are not fed well up to maturity, good cows cannot be expected, for if they are fed only enough to support life we cannot look for developments in other directions. Young stock scantily fed will appropriate their food to the pressing wants of their system, and of course there will be nothing left for their full development, and it is useless to expect animals to be perfected without sufficient food. To leave cattle out all day shivering in cold windy weather, or leaving them to stand in the barn chained to a stake with the doors braced open, while the snow drifts about their legs, is an amusement which but few farmers can afford. This is ventilating with a vengeance.

The difference in the weather between day and night, if one must expose cattle, is often in favor of the night. If it is good to leave the doors open in the day time when the wind blows, why not all night when it is calm? Close observers know how quickly the flow of milk is decreased by the exposure of the cow to cold windy weather.

Farmers intend to be kind to their stock and would not allow them to suffer if they knew it, but it requires a great effort to shake off the old habit to which many have been accustomed from boyhood, of exposing stock to bad weather, and therefore they think it is right and a benefit to the cattle; but they have only to change their practice to become convinced of their error.

Oxen are generally treated better than the cows. They get good hay and grain feed; they are carded, brushed and petted, while the cows are given the swamp hay, the cold side of the barn and the "cold shoulder." Perhaps it saves hay, but will the value of the hay saved pay for the loss on the stock? Dairy stock should not be allowed to shrink in flesh at the approach of winter, for in that condition growth or milk can only be produced at great expense. But if stock be thriving in the fall they are more cheaply wintered, and cows will pay better, and young stock will grow and be in good condition to increase their growth still faster in the spring. There

is no time in the year when it will pay so well to feed liberally as in the fall, in order to have them come into winter quarters in a thriving condition.

Cows begin to shrink in milk the last of July, and therefore need and should have something to supplement the pasture feed. Begin with a little and increase it as fast as the yield of milk indicates the need of it, for it is cheaper to keep up their yield than to let them run down, and then arrest the shrinkage and attempt to return them to their former quantity. If a cow is to be fed a given amount of meal in the fall, it is much better to feed, say one quart a day from the first of July to the first of January, than to feed two quarts daily from October first to January first. It is better to feed some grain food, though the increased quantity of milk barely pays the cost, for the cows will be in better condition and the manure will be worth more.

Heifers before having their first calves require some kind of grain food, composed chiefly of shorts or bran, to develope their milking capacity. With good selections, good feed and good care, we shall have a class of cows which it will pay to feed.

We can hardly fancy a more charming rural picture, than to see herds of nice cows grazing in the valleys and upon the hillsides, or lying in the cool shade of wide spreading trees.

But when herds have become so degenerate that they yield no profit, so that when the owners drive them to and from the pasture with about the same spirit that they would pull the weeds from a garden which has but little else in it, the essential element is not in the picture.

There need be no fear of going too fast on the road to improvement, for profit awaits success. And we may hope that the time is fast approaching when the present quality of stock, resulting from mismanagement, will be thinly scattered, and only remind us of the days when dairying didn't pay. To expect good cows from heifers which we take no pains to select—which are half fed and sheltered while rearing, or to get a paying quantity and quality of milk from cows which are scantily fed and exposed to storms and searching winds—is a delusion that should be pursued no farther.

This, to be sure, was the practice in the olden time, but farmers did not make butter and cheese for sale to a very great extent. But the situation has changed. We have to compete in the markets of the world with the producers in our own, and in other counties,

both in prices and quality of productions, and we must not only follow the lead of the best, but aim to take the lead ourselves.

### Discussion

Followed the reading of the paper, on the comparative profits of raising and keeping young stock and feeding cows for the dairy, which disclosed on the part of the farmers present a lack of appreciation of the possibilities of either branch among them.

Rev. Mr. Kelly said it was a prevailing practice in some localities to sell hay, and he believed the practice could not be commended, and if the products of the farm can be converted into cash on the farm at the market prices of those products, the condition of the farm will be improved by the practice.

Mr. Hopkins, of Newcastle, did not think the farmers were getting back the cost of keeping their young stock.

Thomas Boyd, Boothbay, gave some experience in growing steers up to the age of five years, and did not find it profitable, but had done much better in a small way with cows.

Wm. M. Clark presented a brief paper on Sheep Husbandry, in which he claimed this to be one of the most profitable branches of stock husbandry for Lincoln county farmers. Sheep of a medium grade of wool, or a cross between the fine and the coarse wooled sheep, meet the wants of the locality better than the coarse breeds. The best flock he ever owned was a cross of Merino buck with coarse wooled ewes.

Severe weeding must be practiced and continued if a high condition of the flock is maintained. The practice of selling the best sheep and the best lambs, will soon ruin any flock, and will reduce it to a condition in which there will be nothing good to sell.

A small flock was cited which returned its owner an average increase in one year of five dollars and thirty cents. Another larger flock averaged six dollars and four cents per head. With these figures, the query was raised whether any other stock would pay as well.

## EVENING.

### MILK FARMING.

By T. S. GOLD, Secretary Connecticut Board of Agriculture.

*Mr. President and Gentlemen:* In introducing to you the subject of milk farming as the topic of my remarks this evening, I propose to call your attention, as preliminary to my general remarks, to the methods of the milk supply of the city of New York, the sources from which it is derived, the methods of its transportation and delivery in that city, and to some extent, while I describe the income from the business to the farmer, I shall also be obliged to refer to the vexations and annoyances which accompany the traffic.

For the supply of the cities of New York and Brooklyn, not far from ten thousand cans of milk per day are required, holding forty quarts each. The most of the supply of milk comes to New York in forty quart cans; it is brought in mostly on the railroads from different sections of the country. In addition to these there are those supplies drawn from the swill-milk stables of Brooklyn, which, notwithstanding all the outcry with regard to the filth that surrounds them, and the miserable condition of the animals confined in them, still to some extent furnish what is called pure milk.

From what distance is this milk transported? Pittsfield, Mass., and vicinity, is the extreme limit from which it is brought on the Housatonic road; that is one hundred and sixty miles from New York. The other roads reach, many of them, to about that distance in securing their supplies. It matters not how far they transport it, or how short the distance, their charge is always the same, with the exception of one short road that transports for less. Their charge has been a cent and a half a quart, returning the cans to the depots from which they were taken. On all these roads they have reduced it now; instead of being a cent and a half a quart, which would be sixty cents a can, it is reduced to about fifty cents. The South Shore road of Long Island used to charge only one cent a quart.

How is this milk prepared that it may endure the transportation for the supply of the city? That which is milked to-night and to-morrow morning, sometime to-morrow leaves the farm, reaches the railroad station, arrives in New York during the succeeding

night, along usually about two o'clock in the morning, to be delivered the next day to the customers.

To make this milk, in the heat of summer as well as at all other seasons, get there in good condition, requires some preparation. This is very simple, and there is but one method that has been adopted that seems to be at all satisfactory; all the methods resolve themselves right back into this one; *the milk must be rapidly cooled as soon as it is drawn from the cow*, by placing these tin cans in cold water with the lids off, exposed to the air. It may be stirred or not, until it is cool; some stir it and some do not, and there are strong opinions one way and the other. Probably it is better to stir it until it is moderately cool. The cans are put in a spring of sufficient size to take them in up to their necks, and from which there is a flowing stream of water, a good cold spring. That is the best condition for preparing the milk. As soon as the milk is milked and strained into the can, it is set right into the spring. The milk must, on no consideration, be higher than the water in the surrounding spring; if it is higher than the water, the lower portion of it will cool, and, as the farmer says, the heat is all driven into the upper part, and this will be quite warm while the lower part is cool, and warm milk and cold milk must not be mixed. If the night's milk is kept over until the next morning you must not put any warm milk with it until it has been cooled. In the warmest season of the year, if the spring is a good one, this is all the precaution that is necessary. The milk is taken out the next day, about noon or soon after, and transported, it may be, three, five or ten miles in an open wagon, in the heat of summer, usually with a moistened blanket over it, and placed in a car. Within a few years they have introduced the practice of cooling these cars. The railroad has a box elevated on the car at each end four or five feet from the bottom, and into that a few hundred pounds of ice are placed, and when the car is full of cans it is closed up and is not opened until it arrives in New York, the supply of ice put in being sufficient to last until the milk shall arrive in New York. This cooling on the way amounts to nothing if there has been any neglect in regard to its cooling when it is first milked. That is the essential condition, and with that, the length of time that it will keep sweet, in a fit condition for use, is perfectly astonishing to any one who has been in the habit of handling milk in any of the old methods of setting milk in the pantries in open pans.

The quality of milk for drinking purposes in the family is very much improved by this method of cooling in water. If you want to enjoy good milk for drinking purposes, cool it in that way; put it in a tin vessel if you have no cooler and put that into a larger vessel of cold water where there will be a flow of water from it to carry away the heat; stir it up if you wish to prevent the cream from rising, and I assure you that for the use of infants who need nicely prepared, choice milk, there is no way equal to it, and for your own table use, you will be surprised at the fine pleasant flavor and freedom from all unpleasant ones, if the milk is good when you put it there. The lids must not be put upon the milk until it is cool. If this milk is closed up, covers put on while it is warm, the animal odor begins to accumulate and is very offensive, and settles back into the milk and destroys it in quality.

The cans are taken by the milkman, he paying the freight, and by him peddled about the city. They go to the station from two to three o'clock in the morning to get their milk, and drive to their routes in Brooklyn, perhaps getting there at four or five o'clock in the morning, and by nine o'clock the whole delivery of the milk in the city is supposed to be completed. They may sell a little from their shops later than that.

There are some other methods of supplying New York with milk. There is the recent system introduced of putting milk in glass jars—the Lester Milk Co's process or arrangement. This is a patent jar of glass which contains either one or two quarts, and the milk having been cooled just in the manner I have spoken of, in tin coolers or cans, is drawn into these jars and an air-tight lid with an india-rubber band is pressed on with a screw, so that the milk shall be continually under pressure to avoid any shaking; then it is packed in boxes and if the box is kept right side up the cream rises in these jars; they are as large at the top as below and they can be opened and brought on to the breakfast table and the cream skimmed off by the lady at her own table, provided it has not been subjected to this process in the kitchen.

The Warren Milk Company's bottle is a large glass bottle with a large open mouth, and is more extensively employed than the Lester Milk Company's jar, because the bottle is much cheaper than the jar. There are several companies now engaged in delivering milk in these bottles; it is put up at the farm in these bottles, or it is put up in the city of New York, being transported there in tin cans,

and then put in the bottles and delivered. Mr. Starr of the Echo farm, in Litchfield county, is doing a very extensive business in shipping milk in these glass bottles of the Warren Milk Company. But the milk all has to be cooled in open cans in the way which I have described, before it is put into these bottles. The railroads charge no more for transporting a quart of milk in a glass bottle with its attending box than they do for transporting it in a tin can; it is a cent and a quarter a quart whether it is in one shape or the other, although the boxes are very heavy and the glass jars are heavy. They can well afford to do it, because the profits upon transporting the milk in the tin cans are very large to the railroad.

With regard to the purity of the milk delivered in New York. We have heard so much about watering milk in the city that really most people believe it is extensively practiced. It is practiced no doubt to some extent, but to a very small extent. The milk delivered there from the hands of the farmers is in good degree in a state of purity, and largely delivered by the milkmen in the same condition. The milk detectives are after them very closely to see if there is any attempt at adulteration, and they are promptly punished if they are detected with any adulterated milk in their possession.

They are quite particular with regard to the quality of milk furnished them. It depends very much, however, upon the abundance of milk in New York, what the milkmen will take and what they will bear. When milk is flush, as it is in May and June, they are full of their complaints with regard to the quality of the milk, but when milk comes to be as scarce as it has been since the first of August onward, on account of the great drouth that has affected the dairy region of New York State especially, those milkmen are very quiet, very much afraid to make complaint. They know that a complaint on their part would be a signal on the part of their milk producer to seek a customer elsewhere, and it would be almost the ruin of a milkman in New York to have his producer in the country desert him in such a period as we have had since the first of August.

Milk as a rule on the platform has sold very much higher than the regular producers have received for their milk. Some men follow the business of sending their milk to New York to be sold on the platform by agents for what it will bring. That is called platform milk. From that platform milk the milkmen make up their extra supplies when their usual supply fails in any way. There is

a considerable quantity sold in that way from day to day, sometimes amounting to hundreds of cans. There is a large class of middle men, agents, who stand between the farmers and the milkmen in New York, and guarantee the sale and collection of the pay for all pure milk, sending them a charge of 9 cts. a can of 40 quarts for these services, and taking the risk themselves. There is risk in selling milk always as you are usually from one to two months in their hands. The milkman complains when milk is abundant; he sends back on his bill "short milk." What does "short milk" mean? It means that he claims the cans when they got there were not full. Accidentally they may have been spilled, but more probably the brakemen on the road or about the railroad stations have helped themselves. The Railroad Co. guard that as strongly as they can, and any man in their employ that tampers with the milk will be directly discharged. Still there is some short milk. There is sour milk too. A can of milk is shipped back to the farmer, and to get his can he has got to pay freight both ways, down and back, and it has been shipped back as "sour milk" and possibly was sweet when it got back into the country—had been to New York and got back the third or fourth day, making a journey of nearly three hundred miles, and returned as "sour milk" and on examination by the farmers is found to be sweet.

The price which this milk brings varies according to the different seasons of the year. In the summer season the farmer gets about 2 cents a quart, sometimes a little less, sometimes $2\frac{1}{2}$; along in September it is apt to work up to 3. In the winter it stands at 4 cents and probably will remain at that until the first of January, perhaps the first of February. Milk usually falls off in price soon after the first of January; the supply from the Erie road increases rapidly after that season. The demand for it in New York is quite variable and depends upon a number of circumstances —varies to the amount of several hundred cans per day. In May, if you have dull, wet, cold weather, the farmer will be receiving orders from his milkmen not to send so much milk, cannot use it all; coming along into June the amount of milk is perfectly enormous that the farmers are desirous to crowd upon the market. If June and into July is clear, bright and warm and strawberries are abundant the supply of milk used in New York increases enormously; the amount consumed in the strawberry season, if the weather is favorable, is very much increased. A little later the city population begin to retire, many

of them into the country; that shrinks up the demand. Although the heat and habits of drinking milk still remain, the demand is diminished. The city people come back again about the first of September, and milk is always scarce through September, October, November and December. Those months are the particularly scarce months in the city, in which almost every day the demand exceeds the supply. Perhaps the rest of the year, we may say the supply exceeds the demand.

There are certain other conditions that determine the abundance of the supply of milk in New York. There are an immense number of creameries out on the Erie road that buy the milk of the farmers to make butter or to ship the milk to New York, just as they please, and they agree to pay the farmers the market price that milk bears that particular week, or that particular month, so that it is for their interest to break the New York market, which they can well do, as they control those cans of milk, by sending it to New York in surplus quantity at any time. When they get the price of milk established for the month, then they can well keep their milk at home, it being low enough so that they can afford to manufacture it into butter. They ship the skim milk to various institutions about the city of New York in the surburban districts that are not under the strict control of the police, the milk detectives, who would not allow the skim milk to be sold in the city. It is shipped there however, and sold in very considerable quantity to some of the public institutions in the suburban locations. These men who control such immense quantities of milk on the Erie road, at any time can supply any extra demand in the city by a telegraphic notice of a few hours.

About how much milk does a dairy furnishing milk to New York supply per cow?

From 50 to 60 cans, probably, of 40 quarts each; 2,000 to 2,500 quarts per cow would be about the amount of most cows sending milk to New York, yet this amount in individual cows in individual dairies is very much exceeded. Mr. Collins, who is selling milk in one of our local markets, told me that a dairy of cows that would yield 10 quarts a day all the year round, average that, was his ideal of a dairy of cows, and that he had a dairy that would yield that amount; that would be 3,650 quarts per year from each cow.

In sending milk to New York, it is expected that every man that sends will send two-thirds as much in the winter season, at least, as

he does in the summer season; no milk producer would be considered a good producer by his milkmen, who did not send two-thirds as much in the winter season as in the summer. In order to enable us to do that we are obliged to have a portion of our cows come in in the autumn, and to use a considerable amount of grain in our feed for the winter. Turnips will produce an abundant flow of milk; no other roots or scarcely any other material will effect the flow of milk so much as turnips, but they must be fed with extreme caution immediately after milking, and if free from rotten ones or heated tops or anything of that kind they may be fed in moderate quantities without any injurious effect upon the milk. If they are decayed or fed irregularly, and if the cows are allowed to have access to large quantities of tops in the field, you will hear from the milk at the other end of the route directly in regard to it; it may not show its appearance in the milk when it is fresh drawn from the cow, but in twenty-four hours it gives a peculiar flavor to it that no one admires.

Bran is a favorite grain for feeding for milk; it increases the flow of milk, but adds little to its butter properties. I refer to ordinary bran. Buckwheat bran or ground buckwheat will increase the flow of milk more than any other grain with which we are acquainted, and it makes the poorest milk that a cow can be made to yield; it has no good qualities that I know of, under the head of milk.

Indian meal added to bran gives a rich, heavy bodied milk, and fed in the proper conditions is a very excellent feed in connection with good hay.

Cotton seed meal is another article of the same nature, although differing in its properties very much from the Indian meal. I will here give my opinion with regard to the conditions under which Indian meal may be fed profitably to dairy cows. Some cows run to flesh; you give them very much Indian meal and it increases the flesh propensity, without affecting advantageously the milk producing quality; hence the farmer says it will dry up the cows; but fed in any moderate, and even what would be called an immoderate quantity it will not dry up a good milking cow. My ideal of a milch cow is one that will respond in milk, to the additional amount of food you give her, very liberally, going very far in that direction without running to flesh. While four quarts of meal, or a peck of meal, would dry up some cows, it may be fed advantageously and, as far I have been able to judge, profitably to the class of cows in which the milk producing tendency largely predominates. Hence, if

I had a dozen or more cows I should not order the same amount of meal for each cow, but should distribute it according to the condition of the cow, the length of time that had elapsed since calving, and all the other conditions of the differing individuals. While the bran is a perfectly safe feed, has no tendency to produce derangement of the milk organs or of the digestive organs, Indian meal is heating, stimulating and has a tendency to put on fat, and, especially if fed in too large quantity, to stop the secretion of milk in most cows. Cotton seed meal has a greater tendency to produce a flow of milk than Indian meal, and the caution with regard to its feeding must be that the milk secretion be not crowded too far.

Linseed meal, both the new process and the old, is a very favorable feed for milch cows. There are some objections to this if fed in large quantity, as it affects the quality of the milk for butter injuriously; and possibly cotton seed meal would have the same injurious effect for butter if fed in too large quantity.

The general management of our cows is to give them what good early cut hay they will eat twice or three times a day; our general practice being to feed but twice a day to hay and once a day to grain feed, varying in quantity and quality with different farmers.

Unless you feed some grain you will find it very difficult to keep up the supply of milk and the thrift of your cows during the winter season. Producing milk for the market is considered to be an improving one to the farms. Farms in Duchess county within my knowledge were largely grain farms until within 40 years, and they had become very much reduced in their productiveness. Some of the finest lands in the State of New York, and they are as good as any in the United States, had become very much reduced by the system of cultivating grain and selling it. They introduced the system of selling milk, sending it to New York, and instead of being sellers of grain they became buyers of grain, and the productive capacity of those farms, farm after farm, is double to-day what it was thirty or forty years ago; they are restored to the fertility which they formerly possessed.

They shipped down the Hudson oats, wheat and other grain for the supply of New York until they could not raise enough for their home consumption, and it was just at that period that the supplying of milk to New York was established along the Harlem railroad, and the quantity of grain that they have consumed, together with the

cattle they have kept for pasturage, has brought back again the fertility to their farms.

Great pains must be taken all through the summer season that the animals do not get any noxious vegetation that will injure the milk. If they get hold of onions you will know what the cow has been about when you come to use your milk, and garlic is a wild onion that grows in certain districts, that is destructive to the quality of milk. No dairy district can be perfect that has garlic growing on it. Garlic comes up with the first vegetation in the spring and lasts two or three weeks, and the cows eat it and the effect upon the milk and butter is perfectly intolerable. There is no remedy for it in those regions where it prevails but to shut their cows up during that period in the yards and stables and feed them on clean, dry hay until the garlic has grown, gone to seed and died out.

Cows must have plenty of good water to drink. The quality of the drinking water of the cows affects the milk seriously. The quality of the drinking water about the spring house must be as clean as it can be possibly. Milk is the great absorber of all odors, and of all kinds of exhalations. So cream and butter are absorbing continually every odor and exhalation that may be spread in the atmosphere around them. There are cases on record where fatal disease has been communicated through the milk from families where disease existed to the families that partook of the milk. I do not believe that these germs of disease passed through the body of the cow, and thence through the milk and in that way were communicated, but I believe that the water in which the milk cans were cleansed or in which the milk utensils were cleansed had in some way become infected and in that way the germs of disease were carried through the milk to the families consuming it. There is nothing better established than that milk may be, under such conditions, the transporter of disease. Milk has the widest range in the quality of its products and in the price that they bring in the market, of any agricultural product that is sold, and it is owing to these peculiarities, and to the nice things to be considered in manipulating this product that one dairyman's butter brings 10 cents, which is more than it is worth, while another brings 50 or more. It is hedged about with difficulties from the beginning to the end. A decaying carcass left on the surface of a field where the cows graze has been traced in

cheese factories as the cause of a disturbance of a whole day's milk and the ruin of the cheese from it.

When you attempt to make gilt-edged butter and think you can make it easily, you will find that the path is a narrow one that you have got to tread; you have got to have good cows; you have got to see that these cows are well fed; you have got to see that those cows are milked at the proper time and in a proper way—in a kindly way. Do you suppose those cows, if beaten with the milking stool and kicked and thrashed around and chased by a dog, are going to give you the milk that will make your high priced butter? In the human subject, any undue excitement on the part of the mother, irregularity in diet, everything of that kind results in a sleepless night with the babe. Just so sure as the cows are abused or fed on improper materials, just so sure that milk is more or less deteriorated by the process and just so far rendered unfit for human food in its best condition. It has been often said that infants that are fed upon milk must have the single milk of one cow furnished them. That has been a very plausible idea, but it is now discredited by the best authorities. The milk of ten cows mingled will probably furnish your infant with a more perfect, uniform and satisfactory form of diet than the milk of any single cow followed continuously. That is the experience drawn from a good deal of observation on the part of those families interested in the subject.

The feed for milk depends somewhat upon the purpose for which you design your milk. If you were going to make butter you would find little profit in adding wheat bran to your ration, and if you were going to sell your milk the Indian meal would be one of the least profitable articles that you could employ, because the quantity would be less increased by a dollar's worth of meal than it would be by a dollar's worth of bran or a dollar's worth of cotton seed meal.

In regard to the value of a quart of milk, in the summer season with abundant herbage, cows naturally coming in along in April, the farmers can sell milk and make money at it at two cents a quart, and with the competition and the surplus in the milk market, very few farmers, whether making that milk into butter or cheese, or selling it, can realize more than two cents; but when the same dairy has shrunk up in October, your milk will bring more than two cents made into cheese or butter one year with another, and the milk will sell for more than that in the market. As quick as you

strike November and begin to feed from your barns, the milk will cost the farmer more than two cents.

When you are estimating the relative income from making cheese and butter, or selling milk, you have to consider several things. Cheese is made from the milk at that season of the year when it is most abundant and most cheaply made; cheese is mostly made beginning in April and closing in October, and the cows go dry during the hard season of winter and are fed upon coarser forage, and still will come out in good condition in the spring. You can get a flood of milk from a cow in the eight months of summer, which goes dry during winter. She will give more milk on the cheese system, when you are looking for that alone, in quantity, than upon the other system where you are looking for a continuous supply.

Formerly butter was principally made in the summer or fall, and that little made in the winter was considered of very little account. Since the introduction of the creamery business and the demand for fresh made butter every day in the year, a great deal of butter is made in winter and butter that is well made in winter from well-kept, grain-fed cows will bring a higher price in the market all the time than that which was made in the best season and kept, no matter how nicely, up to that date. The market demands a certain butter flavor fresh from the churn at the present time.

The effects upon the farm of selling milk are good. The farmer is led to watch his cows a great deal more strictly when he measures the milk every day. It is astonishing how a dairy of cows will swell or shrink according to the treatment they receive in the way of feed and water, especially in the summer season. The amount of milk furnishes so good a scale by which the farmer can judge of how his cows are doing that he will get a great deal more from them when he goes to selling milk, than he did while he was engaged in either of the other occupations of making butter or cheese.

Dairymen have all been surprised that there has been no glut in the dairy markets for a long time; there have been short periods of a surplus and consequent low prices for a few weeks, but for a number of years the demand has generally exceeded the supply of dairy products. Sometimes it is butter that is especially scarce, sometimes it is cheese that is high, and sometimes it is the demand for milk that goes out through our cities and small towns. The demand has continually exceeded the supply. How is this? A dairy cow cannot be got up to order on short notice, and if there is a scarcity

of dairy products in Maine, your going out and purchasing a cow of your neighbor does not help the supply of dairy products in Maine particularly, unless you are a great deal better feeder than he was of whom you bought. The purchasing of cows from one section to the other does not affect the dairy products in the country, and it will take from two to three years to get up a dairy cow to any degree of productiveness; and the very demand for dairy products serves to check the source of supply. When a farmer can get a big price for his milk, butter or cheese, he says, "That is a great deal more profitable than raising young stock, and I will not raise that calf."

I believe the prospect for the dairy in years to come is as good as it ever has been,—that the demand will keep full pace with the supply. While there may be temporary depressions, we are assured every time by dealers that the market cannot be overstocked with first class goods.

DISCUSSION.

SEC. GILBERT: I would like for the speaker to explain what he means by rich milk; he referred to rich milk and good milk.

MR. GOLD: The milk that will yield a pound of butter from ten quarts or less, I should consider fairly rich in the butter product; and milk that would yield twice the amount of cheese from the same quantity, I should consider rich in the product of cheese. The valuable constituents of milk consist of the oily part, the butter, the caseine, and the sugar of milk, and a small quantity of saline matter in addition. Some milk is rich in butter and poorer in caseine or cheese, and some is the reverse of this. If you want a good milk for family use and for the ordinary purposes of milk, you want that which has an abundance of all these elements in it; you do not want a poor watery milk made of buckwheat bran or any light food of that kind.

QUESTION. Is it not possible to have a milk rich in butter and yet not be able to make a large amount of butter of it?

MR. GOLD: Yes. The milk of some cows—some breeds, and individual cows,—separates its cream less freely and less perfectly than others. The skim milk of some cows contains an abundance of nutritive matter, and of others it is very poor indeed. The doctrine is advanced by scientists, that by improving the rations of a cow beyond a certain point you cannot improve the quality of the milk; but up to that point the improvement goes on and shows

itself in the improvement of the milk. There is no doubt about that. Any man who is sending milk to New York, let him feed his cows on buckwheat bran for a very few days and he will hear from his milk; or if he chooses to take it and taste himself, he will see the effect upon its quality.

Sec. GILBERT: Can you increase the butter percentage in a cow's milk without increasing the caseine in the same ratio?

Mr. GOLD: To some extent you can, but you cannot very largely disarrange the relative proportions. You are well aware that you can feed wheat bran and get more milk, and that undoubtedly has more caseine than the less number of quarts of milk that you received before; but you get less butter, or get no more butter than you did before. Suppose to-day you are getting a pound of butter from ten quarts of milk, and you give that cow wheat bran enough to make her give eleven quarts. It would take just about eleven quarts of that milk to make a pound of butter.

Sec. GILBERT: What constituent of that milk have you increased?

Mr. GOLD: You have probably increased the total quantity of caseine somewhat, but largely the water of the milk. I do not mean that the change would be abrupt, but the change would take place after a sufficient time in feeding.

Sec. GILBERT: Is it possible to make good milk in winter, that is, a milk from which may be made a first class quality of butter, containing that delicious aroma which makes butter so valuable.

Mr. GOLD: The experience of the choicest private dairies and of the creameries is that there is no impossibility in doing it. It is merely the difficulties that surround it. The animals must be kept clean and must be fed upon sweet, well cured hay. They must not be obliged to eat weeds that they would refuse in the summer season, to make up a sufficient supply of feed. We are very often forcing them to take feed in the winter that they would reject in the summer.

Above all we need to supplement this dried grass with some grain-feed of a rich, pure quality in order to secure milk of the best quality. The conditions under which the milk is kept after it is drawn from the cow are not so much under control in ordinary farm practice as in the summer season. One of the worst places to set the milk—and one of the likeliest ones to set it—in the winter would be in a side dairy room, perhaps opening into the kitchen, and the good wife opens the kitchen door every day to let the warm air in to warm the dairy room, and she boils her onions and her turnips and cabbage in the kitchen, and if the doors are open through

one, two or three rooms into the dairy where the milk sets, it will, not only as milk absorb these odors that I speak of, but as a cooler substance, it will absorb them and will be directly affected by them. The steam from the kitchen stove becomes a carrier of the odors of everything that is done in the kitchen, and the milk and cream are the most ready and greedy to absorb it.

Hence the difficulties that surround making good butter in winter are numerous, but they are not insurmountable, as they are overcome every day by many who are reaping the advantages of this winter market.

QUESTION: How about the color of butter in winter?

MR. GOLD: If considerable meal is given to the cow that is inclined to give yellow butter, very little, if any, artificial coloring matter will be required; yet the addition of a small quantity of pure coloring matter, if it is not carried to excess, is not considered objectionable and is generally practised. But the feeding of grain will largely provide against that necessity.

MR. FLYE: What proportion of corn meal would you recommend to be used with wheat bran?

MR. GOLD: If I was feeding four quarts of bran a day to a cow, I would begin with a very small quantity of Indian meal. At first I would not give her over a quart a day, and I would increase that from day to day and from week to week, until I had got up to as much as she would bear. I know that some cows will bear a peck and not fall off in milk or be disposed to dry up, but will respond to the meal directly in the quantity of milk that they will yield, as well as in the general thrift of the animal, up to that quantity, and very likely more than that in some cases; but it would not do to begin with that at first; you would certainly throw your cow off her feed and fail of your object.

QUESTION: What effect would it have upon the quantity and quality of butter to freeze the milk?

MR. GOLD: I think it has a bad effect as far as I have had any personal knowledge. One method practised in the winter season by some, and at all times of year by some, is not a bad one. The milk is heated as soon as it comes in from the dairy up to nearly a boiling temperature, not quite, and set in that condition, and by the time it is cool pretty much all the cream is raised. The color of the butter in winter will be very much improved by this process, whereas by the freezing process it becomes very white. You may set your milk in deep cans, if you please, in winter in water, where

it will not freeze, and that will bring your cream up pretty rapidly and of good quality. It must be kept after it is raised in that way until it is properly ripened before it is churned. In the ordinary process, formerly practiced, of letting it stand until the milk is beginning to turn, this ripening process is little regarded, or rather has already taken place, but the dairyman who skims his cream from milk very far from being sour, in order to secure the best results in churning, is obliged to let the cream ripen, as it is called.

## AROOSTOOK COUNTY.

### Institute at Linneus.

An Institute was held at Linneus, November 16, which drew together a good representation of the farmers in that and the adjoining towns. The members of the Board met a cordial reception at their hands, and, with many other kindly attentions, were tendered free entertainment during their stay among them.

The Institute was called to order at 10 o'clock by J. D. Gove, the member from that county. A large number of the farmers of that section being interested in factory cheese-making, the subject arranged for the forenoon was—"Comparative profits of associated cheese-making and other branches of stock husbandry."

W. P. Kinney called attention to what he claimed to be a fact—that the farmers of the vicinity were laboring under the disadvantage of poor cows and poor stock generally. A good animal pays much better than a poor one for its feed and care, and therefore the first to be looked after was better breeds for the purposes for which they were kept.

The practice of selling hay is creeping in among them, on the plea that money can be realized quicker than when it is fed to animals. The practice, however, is a bad one and should not be encouraged.

Mr. Porter and Mr. Slip spoke at some length in regard to the greater profits of better care and more liberal feeding of stock of all kinds, and claimed that in their practice they always found that the greater profits always followed from the best care and feed.

In the afternoon the President of the Board, G. M. GOWELL, discussed the profits of dairying, and compared them with the profits of raising stock, and the making of beef, laying down the claim that, when compared with other branches of stock husbandry, dairying when intelligently handled, will bring better returns from the food consumed and labor required than any other branch of the business.

The member from Washington county, A. R. LINCOLN, laid it down as a law, that the profits of dairying, whether cheese-making by the associated system, or butter-making, were dependent on good feed and the consequent generous production which will follow; and claimed that Aroostook county was especially well adapted to the securing of this end.

Mr. KINNEY, and other patrons of the cheese factory, claimed they found this more profitable than keeping other kinds of stock.

In the evening the subject of "Methods in Butter Making" was presented by Mr. GOWELL, and followed by the Secretary, and by FRANCIS BARNES of Houlton, and others. The attendance was good—many ladies being present—and the deep interest in the subjects under discussion was kept up to the close.

After an expression of thanks for the interest manifested, courtesies tendered, and hospitalities received, the Institute adjourned.

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## INSTITUTE AT FORT FAIRFIELD.

A ride across the country from Linneus to Fort Fairfield, through a section now being rapidly reclaimed from the forest and opened up to profitable production, was full of interest, as the improvements everywhere manifest were of promise.

November 18th an Institute was held at Fort Fairfield, at which, in the forenoon, the Secretary presented the subject of "Fertility and How to Maintain It."

Many of the farmers present being patrons of the cheese factory recently established in the town, in the afternoon the subject, "Prerequisites to Success in Dairying," was discussed by FRANCIS BARNES, proprietor of the Nickerson Cheese Factory at Houlton.

In the discussion following—many of the farmers being more or less interested in sheep husbandry—the comparative profits of the

two branches were carefully examined. Happily, many of the farmers had kept a record of their receipts—both sheepkeepers and dairymen—and on being presented and compared, it was plainly shown, that from a given cost of keeping, the cows returned the larger profit.

In the evening the "Possibilities of Northern Aroostook" were discussed by all the speakers present and by several of the leading citizens of the locality. The importance of being opened up to railroad communication, as bearing upon the profits of agriculture, through which their former relations and conditions would be speedily revolutionized, was held up as an inducement to immigration and an encouragement to enterprise. More confidence in farming as a business, and a stronger faith in the locality as an inviting field for it, were some of the results made apparent.

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## OXFORD COUNTY.

### Institute at South Paris.

By invitation of the Paris Grange, an Institute was held, Dec. 27, at their attractive and commodious hall at South Paris village. Free entertainment was furnished to the speakers, and the lady members of the Grange spread bounteous tables in the dining hall for dinner and supper to all in attendance. The day was stormy, yet a large number were in attendance both day and evening, and manifested much interest in the exercises.

The Oxford member, S. S. Smith, called to order and invited George F. Hammond to preside, who, in taking the chair, spoke of the interest the Oxford farmers feel in these gatherings, and assured the members of the Board that in coming there they met a warm welcome.

## THE GROWING OF SWEET CORN FOR CANNING

was the subject assigned for the forenoon, and was opened by the reading of a paper by Mr. SMITH:

We are nearly all conversant with this branch of farming, and we, in this vicinity, for many years have considered it of considerable importance. We have had various ideas about it. Some have called it a profitable business, while others have said, perhaps, that it does not afford that profit that other branches of farming do.

Farmers, as a general thing, have a good old rule that obtained a foothold away back, years before our remembrance, and I don't know but the Pilgrim Fathers brought it over in the Mayflower. It has served a purpose and we have clung to it as we have to many of our old traditions. This good old rule that I speak of is the "guess so." You ask a farmer, for instance, what it costs him to raise a certain product on his farm and get it ready for market; well, to answer that question, he takes this good old rule and says, "I guess it costs about so much, but I don't know." But things are taking a different turn now. We, as farmers, are beginning to learn that a man to be successful in his business cannot get along under that old rule; he has got to know the facts. If I raise a crop that cost me more for labor and fertilizers than the crop will bring in the market I had better let it alone. And for that reason these meetings are to be of use to the farmers, for we aim to present the facts, facts that we can demonstrate; and in discussing the matter which is assigned for this forenoon I shall present facts mainly, and facts that it is believed cannot be contradicted.

I will say one word, before commencing upon the discussion, in relation to the canning business in this place. It commenced here in the earliest days of corn canning in the State. In 1866 Plummer & Marr established corn canning in this village. They fitted up an old barn for the purpose; carried on the business for one year, and then sold out to other parties, at a loss, it is said. In 1868 George Burnham, or Burnham & Morrill, bought out the corn factory in this place, and the same year, built the present factory, and have carried on the business here every year since. The business is coming to be an important factor among the industries of Maine. From a small beginning, but a few years ago, it is rapidly assuming large proportions. The great increase of the business and the rapid multiplication of canning establishments is pretty

conclusive evidence that those engaged in canning are receiving at least fair profits. That farmers continue to grow corn for the factories from year to year, hauling it distances varying all the way from a few rods to ten or twelve miles, seems quite as conclusive that they also find a profit in growing it. The business had increased so that in 1873, 475,000 dozen cans were put up, and it was spoken of at that time as having assumed vast proportions. Since then it has increased so that the annual product now is 400,000 cases of ten dozen cans each. Market value, $1,000,000. But little of this money goes out of the State excepting that paid for tin and solder. At least $750,000 remains for the crop grown, lumber for boxes, labor, &c. As a rule, farmers will grow that crop which they know or think will give them the best returns.

Now, all I have said will go for nothing when a farmer is asked for the first time to grow sweet corn. The first question he will ask is, Does it pay? In order to answer this question, the amount expended for labor, manure and other fertilizers used, and interest on land, compared with the cash value of the crop, will show at once whether the growing of the crop is attended with profit or loss.

But I will put the question in a little different form: How does the growing of sweet corn compare in point of profit with other crops usually grown on the farm? In this form we solve the question by comparison. For this purpose I will take one of the leading crops of Maine—Indian, or yellow corn. I take this for the reason that the requirements of the two crops are so very nearly alike. If we grow sweet corn we shall have to buy what yellow corn we use—and we must have some. A Maine farmer would hardly know how to get along without corn for fattening purposes. If the money from an acre of sweet corn sold, will buy more bushels of corn than the same acre would have produced had it been planted to yellow corn, the argument would be in favor of sweet corn. If it would not, then we must give yellow corn the preference, unless it can be shown that other advantages attend the growing of sweet corn.

Statistics in regard to almost all farm products have been gathered either by State or National authority, but I find no mention of this business in the tables of State or National reports; even the last elaborate census returns failed to make any mention in regard to this important business, so that I have been obliged to rely mainly upon my personal experience and the Yankee habit of asking questions. By reference to the Reports of the Department of Agriculture, I find

that the average yield per acre of yellow corn in Maine in 1877 was 36 bushels; average price per bushel, 78 cents—amounting to $28.08 per acre. In 1878, average yield, 40 bushels; price, 65 cents per bushel—total per acre, $26.00. Average yield in 1879, 30 bushels per acre; price, 76 cents—amounting to $22.80 per acre. The average for the five preceding years is 28 3-5 bushels; average yield for the three years, 35 bushels; average price, 73 cents per bushel; average value per acre, $25.62. The cash value per acre of sweet corn at 3 cents per can of 27 ounces, grown in this immediate vicinity for the factories, is as follows: Paris, 1881, $32.55 per acre; Rumford, 1881, $50.00; Bethel, 1880, $42.00; same, in 1881, $45.00; Norway, $37.50. Average price for sweet corn grown for these four factories in the years mentioned, $41.41; from which deduct the average cash value of the yellow corn crops grown in the State during the years before mentioned, and it shows a balance in favor of sweet corn of $15.79 per acre.

It will be borne in mind that these figures are averages in the case of both the yellow corn and the sweet corn. Individual cases are to be found where the receipts have far exceeded the figures named.

As evidence that the producers are considering this a more desirable crop than the yellow corn, we have the fact that in this vicinity, where it has long been a leading crop, it is still holding its supremacy; and the past year a new factory has been erected at Norway to meet the wants of the farmers in working up the increased production of this immediate vicinity.

This business brings with it other industries which give employment to labor. Large sums of money are paid out annually at all corn factories for lumber for making the cases—for labor in and about the factory. Husking gives employment to many infirm persons and children who otherwise could not be profitably employed.

A large sum is annually paid at the factory in this place for beans, amounting the past season to more than $5,000. The growing of beans is by some considered a better paying business than growing corn. A much larger amount of money can be got from an acre of beans than from an acre of corn, but beans require much more labor than corn, and can be most profitably produced by those who have children to do the shelling, who are not much importance in doing ordinary farm work. W. O. Perry of Norway raised the past season 128 bushels and 29 quarts of beans on an acre, and

received for them, delivered at the South Paris canning factory, $2.00 per bushel, amounting to the sum of $257.00 for the beans grown on a single acre in one season; Mr. Perry's father grew 88 bushels on one acre; L. T. Brett 152 bushels on two acres; Daniel Brett 150 on two acres, and F. G. Sawyer 134 bushels on 1½ acres.

At the close of the corn packing season, the factory at Norway commenced canning apples and pumpkins, paying $3.00 per ton for the latter and twenty cents per bushel for second quality apples.

The canning business in this State seems to be largely on the increase, many new factories being in contemplation at the present time. It seems to be conceded that we here produce a superior article, and the prospect is that we may become noted for our sweet corn as well as lumber and ice.

CHAIRMAN: We will now hear from Mr. Cobb, the member of the Board from Androscoggin.

Mr. COBB: I believe it is but little that I can say upon this subject after hearing it so fully discussed by the gentleman who has preceded me, but there are a few points that he has not touched upon, which should be considered in discussing this question.

In the first place I wish to consider the cause of the late increase in the sweet corn canning business. It was but three or four years ago that the sweet corn grown in this State was almost at a loss to find a market; consequently farmers became discouraged and didn't feel very much interest. But since that time the corn canning business has been on the increase; and it has been owing mainly to the introduction of this article across the water into other countries. For the last year or two this business has extended largely; farmers have been invited to plant more, and the prospect is that the demand in the future will be very much larger than it has been in the past.

A question to be considered on the part of farmers in this business is, whether they would be affected if the sale of this crop should cease.

It has been stated that this business is mainly confined to this State; and it is well known that the crop succeeds well here, and that the corn is of a sweeter flavor than when grown in a warmer climate. While we have a variety of soil we have an abundance of light, loamy soils specially suited to the corn crop. No farmer need undertake to raise corn of any kind on a wet, cold, heavy loam. These loamy soils are easily worked, and though they may not be as productive for some crops, yet in many cases a corn crop

upon these soils will not cost more than half as much as on the heavy, hard soils. These lighter soils are very easily prepared, and they can be dressed simply for this crop and give good returns the same season; while upon heavier soils the ground is prepared previously and the crop is raised, not mainly for that crop alone, but for future crops, of grass and the like, which shall follow.

In the management of these soils they should have applied every year a small amount of fertilizer of some kind suitable for this crop and which the corn readily appropriates—not a large amount in one season, but a little every year.

In growing a crop of sweet corn it is highly important that good seed should be obtained, and that is really the foundation of growing the crop. Without good seed we are unable to raise a good crop. There have, in years past, been known two varieties—the Allen seed and the Crosby seed. It is claimed by the packers that these varieties have sort of run out; that they have lost their flavor and are not so good as some other kinds that are brought forward at the present time. There seems to be but little difference in the crops from the different seed, but the name is different. The Planters' Favorite, I think, fills the place of the Allen seed. It is about the same kind of corn, perhaps, but a little different in its flavor at this time, the Allen seed having been planted for so many years. Another kind is the Early Crosby, which is a very nice corn and remains in a green state very much longer than the Allen or the Planters' Favorite, and the planters prefer it, because, in the busy time, they can hold it in reserve many days longer than they can the other varieties. The Late Crosby seed has disappointed the expectations of many farmers who have planted it on low soils, where it hasn't matured. It has matured on high, rocky land, and yielded a bountiful crop.

There is another argument in favor of planting sweet corn instead of yellow corn upon light land. It is seldom that a crop of yellow corn will run clear of frost upon light, low land. Sweet corn comes in early. If you plant the early seed, or seed no earlier than the Allen or the Planters' Favorite, it comes off at a season of the year before the frost troubles it; but you plant the Late Crosby seed, and sometimes the Early Crosby upon this land, and you are liable to have your crops destroyed by frost. Every planter knows that if the crop is not harvested as soon as the frost comes, the same day,

or the next day after, the corn loses its flavor, and is rejected at the factory on that account.

QUESTION: Do the packing companies object to the Allen seed as having deteriorated?

Mr. COBB: To a certain extent; within the last year the most objection has been made.

The method of managing this crop through the season is about the same as with yellow corn, but I claim that the cost of the sweet corn crop is much less. In the first place, the harvesting of the sweet corn crop comes at that season when farmers are not so busy as they are later in the season. It comes to harvest as soon as the hay and grain crops are comfortably cared for, upon early lands. Then, as this crop comes on at that season of the year, it affords a fodder for the stock just at that season when it is most needed, when our pastures are beginning to dry up.

I wish to add one word in relation to the fodder from the factories. From actual experience, I will say there is no concentrated food that will increase the flow of milk so largely as sweet corn cobs, after the corn is whittled from them. It is less work to harvest an acre of sweet corn than of yellow corn. The fodder that is secured from your crop of sweet corn is very valuable. In the first place, after the corn is harvested the fodder can be cured in the field very much earlier than the fodder of yellow corn; secondly, there are no frosts early enough to injure this fodder in any way, and it can be easily dried after the corn is taken off, by being put in shocks. It is very much greener than the yellow corn. You put about sixteen hills of this sweet corn fodder into a shock and let it remain in the field for about two weeks in dry weather, and it is perfectly cured, and without injury to its quality. This can be put in the upper part of the barn or upon scaffolds, standing the shocks upright and putting them near together, and it keeps in this state very well. But what are those farmers to do that don't have this room? Of late years it has been found that this can be packed with straw. Put a lot of this fodder in an even layer, upon the barn floor, if you are short of room, covering a space say twelve feet wide by twenty feet long, and put one or two feet of straw upon this. Place a barrel in the middle of this mow, beginning at the floor, and as you build the mow up raise the barrel, till you get clear up to the top of the mow, or as far as you wish to go. That leaves in the center of this mow a little chimney whereby all the

steam and moisture escape which would naturally come from it. You have perhaps twenty or thirty tons; and in this dry state, placed in a mow like this, it will keep in good order. In feeding this out, with the straw mixed with it, the cattle readily eat it all clean. This is much cheaper than to lift these shocks of corn into the upper part of the barn and pass it around on forks, requiring a great deal of labor.

You hear farmers often object to the idea of raising a great amount of sweet corn fodder, or of any other kind, to put into the barn, because it is so expensive to handle. In this way I claim that fodder can be saved cheaper than in any other way that ever has been introduced.

Sec. GILBERT: Is this sweet corn fodder more valuable than the same number of tons of yellow corn fodder?

Mr. COBB: I will say this much. We never have been able to feed yellow corn fodder to the stock and have them eat it all clean; they eat the leaves and tops and leave the large butts, while of sweet corn fodder they will eat every bit, and there is no waste at all, if it is properly cured in this way. Consequently the cattle thrive much better upon this than upon yellow corn fodder; and for these reasons I consider it much more valuable.

Now as to the value of this corn fodder and straw as compared with hay. Every farmer has more or less oat straw, barley straw and wheat straw, that he wishes to dispose of, and by mixing them with this fodder, he can feed the mixture to his herd of cows or other stock. From actual experience in feeding cows with sweet corn fodder mixed with straw, I claim that the sweet corn fodder from one acre of well grown corn, mixed with oat straw and fed in this way that I have spoken of, is as valuable as three tons of good English hay; or, in other words, that one acre of sweet corn fodder is as valuable to feed, and will produce as good results, as two tons of good English hay, and that straw mixed with it serves to make it go further to the extent that I have named.

It is well known by the farmers throughout the State, that last season was a very poor season for corn growing—the poorest in our section for the past nine years. The average amount paid per acre for sweet corn in our section, at our factory, last year, was 33 1-3 dollars; the year previous it was 41 dollars, and three years ago it averaged a bit over 50 dollars. These figures for the past year look very small, but I wish to compare them for a single moment with

the cost of raising or buying yellow corn. All the farmers that raise sweet corn depend mostly upon the West for their yellow corn. I had in one field five acres of sweet corn, upon lightish land, that yielded me this year $47.63 per acre. This amount, if laid out for yellow corn in June or July, would have purchased eighty-two and one-eighth bushels to the acre. If it had been invested in corn when it was the highest this past fall, when it cost eighty cents a bushel by the car load, this would have purchased just fifty-nine and one-half bushels to the acre.

Now take the average return per acre of the corn at our factory the past year, which was thirty-three and one-third dollars, and this fall, when corn was the highest, eighty cents a bushel, it would purchase forty-one and five-eighths bushels to the acre. If bought in June or July, when corn was fifty-eight or fifty-nine cents a bushel by the car load, your sweet corn would purchase fifty-seven and one-half bushels of yellow corn to the acre. Consequently the figures from raising sweet corn for our factory have always been in favor of buying yellow corn and raising sweet corn to obtain the money wherewith to do it.

The factory in our county has been running nine years, but some of the farmers have planted longer. I began to plant sweet corn fifteen years ago last summer, when I had to haul it twenty-three miles to the Yarmouth factory, and I considered that a paying business. After the corn factory started at Paris, I hauled corn from my place here, some fourteen miles, and considered that a good thing.

The success of this crop in the future depends very much upon the farmers. If the farmers are satisfied with the results of raising this crop as compared with other crops, they may be sure that the demand is for more corn and more factories and more farmers to raise it; and whether this business is to continue here, remains entirely with the packers of the corn and the farmers.

Mr. A. G. Hammond: After living in the immediate vicinity of a factory, and after twelve years' experience, there is still so much difference of opinion among the farmers in regard to this business that we have met to-day to discuss the question of raising sweet corn. We have learned that under favorable circumstances it is a good crop to raise, and that we can get good returns for our labor. We have also learned that the growing of sweet corn is more or less uncertain. The soil must be in good condition, well manured

and well cultivated. If a farmer has sufficient manure to grow one acre of yellow corn, it is folly to plant two acres of sweet corn. Such a course will only result in failure and disappointment. We know that it is not so sure to come up in the spring as yellow corn; a cold rain storm injures it, a severe drought in the summer prevents it filling out, and an early frost ruins it for canning purposes. Again, it must be picked and carried to the factory in the right condition. If it is gathered too green it cans but little; if it gets too hard it is not canned at all. The uncertainty seems almost wholly on the side of the farmer. Still I believe, with proper care and effort on the part of the farmer, and fair dealing on the other side, the canning business will be one of the great industries of Maine.

There are two parties equally interested in this business, and both sides should have an equal voice in making the contract and fixing the price. For a dozen years the manufacturers have made such terms as suited themselves, and the producers have submitted to their dictation.

This cannot much longer last. The owners of the corn shops are wholly dependent upon the farmers for their sweet corn, and cannot run their factories for a single day if they refuse to raise it.

Not so with the farmers. They are not dependent upon the corn factories, for they have a remedy and have a right to avail themselves of it.

Mr. BRADFORD of Minot: I have not had as much experience in raising sweet corn as many who are here. When the corn factory was started at Mechanic Falls, I planted two or three acres, and in consequence of poor seed my crop was almost an entire failure. The second year my success was a little better. Then I gave it up till the present season. I resolved at that time that I never would plant sweet corn again, unless I could obtain my seed of a farmer that had raised it and I knew it to be a good article. I supposed when I signed last spring to plant, that I could do that, but to my surprise I found I was obliged to go back to the factory to get my seed, and I was unfortunate enough again this year to get poor seed. But still I met with better success this year than I ever had before. My corn grew stout, and matured. The variety of seed was sold to me for Early Crosby, but it was quite late corn. I had no idea the Early Crosby was so late a variety; but as the fall was favorable it

matured and yielded well. Had it all come up as good seed would, I should have had a fine crop—perhaps $60.00 worth to the acre.

Mr. ROWE of Oxford: I think I have raised sweet corn as long as any one in the neighborhood. The first year I planted I had five cents a can, and I could do better at raising it at that price than with other corn. I think it would be more profitable now if I could get about four cents a can than other corn. I consider one ton of sweet corn fodder as valuable as two tons native corn fodder, for me. They haven't been willing to pay me what satisfied me, and I haven't planted for a number of years. I plant the yellow corn, and I find that grinding it cobs and all, it is worth nearly as much per pound to feed out to cattle as the corn we buy. I should be in favor of raising sweet corn, if I could get four cents a can.

CHAIRMAN: Have you ever had any defficulty with the seed you have obtained at the factory, about its coming up well?

Mr. ROWE: I have. I have generally raised my own seed, and have had no difficulty in saving it. I think if the seed is taken care of there is no trouble in securing good seed, but it wants more care than other kinds. If you take your corn off at the right time, and husk it right off and hang it over a pole in a good dry place, I think you will have no trouble in having good seed.

Mr. ANDREWS of Oxford: I have been raising sweet corn for the last ten or twelve years, and always to my satisfaction in comparison with the results from raising yellow corn. I never have failed to get enough out of the sweet corn to buy more western corn than I could raise of yellow corn myself from the same ground and the same dressing. I have had to haul my corn, but I would rather do that than to husk the yellow corn and store it and shell it and carry it to the mill. My sweet corn is carried to the shop, and if I wish to carry home fodder I can get meal from the grist mill, and save travel one way. But as to the relative value of the western corn and what we raise, I am in the dark. I consider this as one of the established industries of this vicinity.

We farmers are apt to be suspicious and to say, "Here are Burnham & Morrill, doing a very large business; they must be getting immensely rich; and as a matter of course they are getting it from us farmers." I am inclined to think we are apt to look upon these things with exaggerated ideas,—that with all the risks of the business, they are not, perhaps, making any more than they ought to.

I don't know as we ought to find fault, if growing it is a better business than we can otherwise engage in.

The past year I got some fifty-two dollars from an acre of corn, which would have brought me, at the time I purchased my western corn, some seventy-five bushels of meal. That is more than I have been able to get from an acre of yellow corn.

I have got my seed from the factory but twice. I practice saving my own seed. The same care will not always produce equally good results. This year, being very damp and warm, it has moulded, although it has been taken exactly the same care of as in previous years. I happened to gather it the night before the frost and placed it away where I have before kept it, in my stable chamber, but still I find it has moulded around the ends where they came in contact with each other. However I saved enough for my own use. There is no better way of saving it than that which has been suggested, of tying two ears together and hanging it over a pole; but I trace it as I would common corn, quite thick together, tie two traces together, and hang them over a pole.

Mr. SMITH: What, in your judgment, is the comparative value of the two fodders,—the yellow corn and the sweet corn?

Mr. ANDREWS: We are apt to speak of meadow hay, straw and old-fashioned corn fodder as rough fodder. I do not consider sweet corn fodder as rough fodder. It is good. The cattle will eat it clean, butts and all, while with the old-fashioned corn there are many large butts left.

CHAIRMAN: In your experience, has it been as safe a crop as the common yellow corn?

Mr. ANDREWS: Just as safe. I never fail of getting a good fair crop, but like everything else, it must be cared for.

Mr. SMITH: I have grown sweet corn for many years, and this matter of seed is quite an important one. The first year I planted corn, the importance of planting seed that should germinate and grow was pretty thoroughly impressed upon my mind, and I have not forgotten it. That year I procured my seed from the corn factory. I knew nothing about the growing of sweet corn and nothing about the different varieties, and I called for sweet corn to plant. While I was planting it, there came up a shower, and I set down my dish with a little seed in it and ran for shelter. The corn remained there a day or two, and had the advantage of soaking there; and when I looked it over, it was pretty fully impressed upon my

mind that there was quite a portion of that seed that would not germinate, and when the corn came up, my fears were verified. Some hills had one spear that showed itself and some two, and occasionally the full complement, but I suppose it didn't average over three spears in a hill.

I have never failed in saving sweet corn for seed so that it would come just as quickly and as much of it as with yellow corn. I husk my corn as you would to trace it; I tie the ends of the husks together and hang the corn over a pole some three inches in diameter, which I have in my chamber. I am careful to have the husks long enough so that the ends of the ears will not come in contact with the pole. I have learned that with sweet corn, if you husk it and lay it on the floor, and there comes on a long spell of damp, warm weather, the under side of the ear of corn is just about as sure to mould as can be. It wants to be suspended where there is a good circulation of air; and where this is done, I don't believe one time in fifty a man would fail to have his corn in the finest condition for planting.

Sec. GILBERT: Is it safe to rely upon it after it has been exposed to a heavy frost?

Mr. SMITH: I think if the kernel freezes it is fatal; but if it doesn't, I don't know that a little frost on the outside would injure it.

Sec. GILBERT: Is there a necessity for greater care in planting sweet corn than with the ordimary corn, in order to secure its germination?

Mr. SMITH: My experience would lead me to say there is a difference in the matter of covering. I think if you cover sweet corn a little deep, and it is followed by a heavy rain, even if your seed is of good quality your corn may fail to come up, or at least more of it would fail than with our common corn.

Mr. ANDREWS: In planting sweet corn, we cannot rely upon every kernel coming as with common corn, but we should not be stingy of our seed. Put in one-third or one-half more than you wish to save in a hill and you will be pretty sure to get enough; then you can thin out, if it comes up too thick, and that is better than not to have enough.

Mr. HARVEY: I have planted some sweet corn, and have had some very good success and some not so good. When I have raised a good crop, I have considered it the most remunerative of any crop of corn I can raise.

I have had a good deal of trouble in regard to seed not coming up well on account of its poor quality, though perhaps carelessness in planting was partly the cause of that. I believe it is essential, in order to have sweet corn come up well, that there should be great care in planting it. Be very careful in regard to the depth, and stamp the ground down well when you cover it.

The remark of Mr. Smith with regard to saving corn for seed is in accordance with my views exactly—that is, you must have it dried thoroughly, and dried in a position where it cannot mould.

Mr. SMITH: It seems to be an important matter that we plant good seed. What is your experience in relation to the vitality of old seed—will it retain its vitality as long as the common yellow corn?

Mr. HARVEY: I have never had experience in that line, and could not answer the question. I don't know as I have ever planted any more than two or three years old, and as to that, I saw no particular difference in its coming.

Mr. HAMMOND: Last spring I planted some in my garden. Something had destroyed my seed corn that I had saved for my own use, and I found an ear or two of corn that had been laid away for half a dozen years perhaps, and I planted it. It looked bright and good and sound, but there wasn't one hill in twenty-five that had one spear in it. It was laid in a dry place.

So far as my experience with yellow corn is concerned, I never had any but what grew well if it was taken care of properly.

Mr. SMITH: I have had an experience similar to Mr. Hammond's. I think a person who plants sweet corn, should know that it was corn of the previous year's growth.

QUESTION. At what stage do you take the corn?

Mr. SMITH: My rule in that respect is this: I set apart a certain portion of the field, about what I think is necessary, for seed corn, and that I let stand for a few days after I gather my crop. If the weather is favorable, I don't make any haste about gathering it till I think it is pretty thoroughly ripened off. I let the husks turn white. If the corn gets a little too full, you will often find ears that would be rejected at the factory from over-ripeness. I select out of these, and treat them in the manner I have described.

There is one point more that I wish to speak of here, and that is in relation to the planting. It is getting somewhat in vogue to plant yellow corn thicker than we used to, and some plant in drills. Down in my town one of our best farmers tells me that he almost

doubles his crop of yellow corn by simply drill planting instead of hill planting.

Is there any gentleman here who has had experience in planting sweet corn other than the usual distance?

Mr. ANDREWS: The past year I planted mine in drills; I fairly sowed it to begin with, and it came up very thick. I didn't manure in the drills, but used some phosphate. It looked far behind that which my father planted, on the adjoining farm, in the old-fashioned way. He had a third more fodder, from the fact that it grew stouter than mine; but in the result, after thinning mine out, although the stalks did not average more than four inches apart in the rows, I had a little the most corn. The ears were of good size, as each stalk had plenty of room.

As to old seed. I raised two bushels of seed and kept it over, and at planting time I shelled it all. There was no call for it, and I kept it for the next year, and I never had corn come better than that, although it laid shelled a year.

Mr. MAXEY: I planted about three acres this last season, and I had better success than I had had previously. The three acres yielded me about 1,500 cans to the acre, amounting to $126 or $127 for the three acres. I planted it in the usual way. I did not manure the hills, but spread quite a heavy coat, and used phosphate, too. I planted the hills nearer together than I ever planted the old corn, the rows being some 3½ to 4 feet apart. I was better satisfied with the crop last year than heretofore.

I must say there were some things that I learned about the manner of procedure that I never had known before. I took it for granted that if I sold sweet corn for so much a can I should get that amount. If I sell produce by the bushel, I don't expect five pecks to be measured out for a bushel. When I came to sell the corn there was reckoned twenty-seven ounces for a can, but when the corn was canned, as I understand it, there was put up twenty-two ounces in a can. That was a kind of arithmetic that I hadn't been conversant with. The agent said last spring that they were going to pay more for corn—three cents per can—and I told him that under these circumstances I would plant three acres, as I had a good chance for it. After I had hauled the corn in, I found out that they had increased the weight of a can—an ounce, I think. That was a matter I had been entirely ignorant about. I don't know whether it was established by law or by the canning factory. I

supposed, in my greenness, that if my corn canned 5,000 cans when put up, I would be paid for that amount.

I was better satisfied with the management of the factory the past year—that it was managed with more economy than heretofore. I was well pleased with that, but I can't say I was so well pleased with the way the price was fixed.

Mr. BURNHAM, of the firm of Burnham & Morrill: I will say that we paid two and a half cents per can of twenty-six ounces last year; this year the contract was three cents per can of twenty-seven ounces. The specifications are on the contract signed by the parties.

Sec. GILBERT: I find there is considerable misunderstanding—somewhat of a lack of confidence—prevailing in some sections with regard to the contract beween producers and manufacturers, from this fact, that the contract requires a certain number of ounces to the can, and the manufacturer puts up a different number of ounces to the can.

It looks to me that this may be and is a perfectly legitimate transaction, although there comes from it, as I say, sometimes, a misunderstanding. The contract, as I understood it, in all cases specifies that there shall be delivered so many ounces of corn for so many cents in money. In this case, it is three cents per can of twenty-seven ounces. That is the contract—legitimate, proper. When these parties put up that corn, they put it up in a manner to suit themselves. It may be said that it is no business of the producers of the corn what the weight of the can is as put up by the manufacturers. They have a perfect right to put that twenty-seven ounces of corn which has been purchased of you for three cents, into three cans, if they see fit. It is a matter of their own, wholly and entirely.

You agree to furnish at three cents for twenty-seven ounces, or two and one-half for twenty-six ounces, as the case may be. You fulfil your part of the contract. Then they, as manufacturers putting up goods for the market, put it up in the form and in the size of cans to suit themselves. The misunderstanding arises from the fact of the measure of the can not being uniform in the contract and the putting up on the part of the company. It is simply a misunderstanding, and not any dishonesty on the part of the manufacturers.

Now, one word in regard to the planting of sweet corn in drills. It is becoming the practice with farmers attempting to grow large quantities of corn to the acre, to plant it in a different manner from what formerly prevailed. Premium crops of corn in the State of Maine are now generally grown from corn planted in drills, rather than in hills. Under otherwise the same conditions the yield is larger than when planted in hills. But there is a danger of getting too many stalks of corn growing on the land. It is not that you want a very large number of stalks growing to the square rod; that is not the point. You want to distribute it more evenly over the ground. For instance: instead of six kernels standing in a hill, you want to distribute those six kernels through the space allowed for that amount. If you plant too thick, the inevitable result is that you get stalk at the expense of ears, while it is for the ears, especially, that you plant the corn. Care should be exercised not to go to the other extreme. Planting an excess of seed with the view of thinning, subjects one, in years favorable for germination, to considerable expense in thinning; but still it insures you a complete stand of corn on the land.

## AFTERNOON.

In the afternoon a lecture was given by FRANCIS BARNES of Houlton, on "Associated Cheese Making." A factory is located at South Paris, and its patronage of late has been on the wane, and with it, confidence in the business as a profitable industry. The lecture was designed to place the matter in its true light, and inspire a confidence in the business which should lead to a wide patronage from the farmers of the locality, and out of which would be secured greater profits than are now obtained. Through the lecture and the discussion following, the subject was carefully and critically examined in all its details, and with much profit.

## EVENING.

A lecture was given, in the evening, by GEORGE M. WHITTAKER of Southbridge, Mass. Subject—"Neglected Trifles."

An expression of thanks on the part of the people in attendance for the valuable lectures furnished for the occasion, and a courteous acknowledgment of attentions received at their hands by the speakers, closed the exercises.

## YORK COUNTY.

By invitation of the Saco Grange, an Institute was appointed at the Municipal Court Room, Saco, Dec. 29, but on account of the impassible state of the country roads, it was postponed to Jan. 26.

The exercises were conducted chiefly in the form of discussions. There were present, Messrs. Cobb, Harris and Gowell of the Board. In the forenoon, "Feeding Cows for Milk" was the subject for consideration. Afternoon, "Comparative Profits of Selling Milk and Butter Making." Both subjects were thoroughly and ably examined by the members of the Board present, and by the many competent farmers of the county.

In the evening, Mr. Whittaker of Mass., repeated his lecture on "Neglected Trifles," given at South Paris.

A large attendance of thoroughly interested farmers and their wives made the occasion of much interest and profit. A hearty welcome to the Board and its work was given.

Dinner and supper in bountiful supply for all present was furnished by the Grange at their hall near the place of meeting, and entertainment for the night for the speakers and all others from abroad was provided at their homes.

An interchange of compliments, heartily expressed and honestly due, closed a profitable Institute, of which want of space alone prevents a full report.

## KNOX COUNTY.

### Institute at Union.

An Institute was held at Union village, by invitation of the North Knox Agricultural Society, January 3rd. The attendance throughout was good, the town hall in which it was held being filled at all the sessions with an audience of farmers and their wives deeply interested in the subjects under consideration.

In the forenoon, Walter Balentine, Professor of Agriculture at the State College, spoke on the subject of "Fertility, How it is Reduced, and the Means whereby it may be Restored."

In the afternoon the leading speaker was Francis Barnes of Houlton, on "Success in Dairying"—a subject especially appropriate to the locality.

### EVENING.

#### METHODS AND PRACTICES IN FRUIT CULTURE;

By W. P. Atherton, Hallowell.

*Ladies and Gentlemen*:—I am happy to meet you at this time, to talk with you for a few moments upon this subject, one of the most interesting connected with our calling. Fruit culture has received the attention of man almost from the time when he was commanded to go forth and subdue the earth and to have dominion over it; and it would be exceedingly interesting to trace the origin, rise and progress of fruit culture in this country, but we must confine ourselves strictly to present methods of cultivation and their results. It will do no harm to remark, however, that the old ideas which prevailed a century, or even a half century ago, are fast dying out, if they have not already become obsolete. Trees were once planted more for pleasure and as a luxury than for profit; they had no enemies and they needed no cultivation. The soil was then strong and abundantly supplied with all the elements of a perfect plant food. All that was necessary on the part of the orchardist was to drop the seed where wanted, stake about and tend the young plants for a few years while young, prune them lightly as they grew older, and the

work was done. Now, however, this is greatly changed, for, while the processes of Nature have remained the same, the soil has become exhausted of its natural fertility. The constant cropping of the soil without any adequate return has wrought its legitimate work; the old orchards have languished and died, and hundreds of the new orchards that have been set out within the last twenty-five years have also died, or are in a languishing condition. We have had too much confidence in the resources of Nature. We have supposed that the elements of the soil which constitute growth and production could not be exhausted, and consequently we have been slow to bring to her aid our highest art and skill. That we have seen the folly of this no one will question, and that there has been and still is a general facing about and starting right, where we have been all wrong, is also apparent. This is actual fact based on observation; for, travel in whatsoever direction you will, you can but notice that farmers are manuring and mulching, pruning and cultivating their orchards to an extent never before thought of or practiced. There has been great progress in this direction. We need to consider not only what we shall plant, but how we can best advance their growth, for trees will no longer take care of themselves.

In the presentation of this matter we will consider

1st. What do we plant trees for?
2d. What shall we plant?
3d. How shall we care for them?
4th. Fertilizers.
5th. Ruinous results of neglect.
6th. Bounteous rewards of care and fertilization.

### What do we Plant Fruit Trees for?

We do it, first of all, for a love of their fruit and for the pleasure and satisfaction attending its growth and its use. We plant them, too, for profit as well as pleasure. They have become a necessary adjunct of the farm and a part of its income. In hundreds of cases the orchards now planted yield a fairer average annual income than any other product of the farm.

But there is one more reason why we plant them; it is for our children as well as ourselves,—we plant for posterity. Once it was thought absurd even for a young man to set out trees, and if an old man of seventy undertook the task, it subjected him to the ridicule

of the whole neighborhood. Not so now, however; even an old man may plant trees and be thought wise. We must not be selfish, we must not plant simply to afford ourselves pleasure and profit, but that the generations that come after us may be benefited.

### What shall we Plant?

The answer to this question is of as much, nay, more vital importance to us than that which we have already considered. It is no trifling matter. It does make a difference whether we plant strong and hardy, or weak and tender stock; it does make a difference whether we plant sound or diseased stock; it makes a difference whether we plant scrubby, ill-shaped, half-starved stock, or clean, upright, well-fed stock.

Never accept inferior stock because it is cheap; never accept inferior stock of any kind from any source whatever, or on any conditions. Purchase only the best stock, even if you have to pay the very highest prices. The best is always the cheapest in the end. Hundreds make a serious if not a fatal mistake here in the first step towards starting an orchard. The expense is something, and it looms up to the beginner, but we must all remember that, generally speaking, that which costs nothing is worth nothing. I speak from actual experience when I say that nine-tenths of all the scrubs pulled up in the pastures and woods are not worth the pulling and setting. There are exceptions of course to every rule, and there are exceptions in this case. If, however, you are determined to try this sort, select only the straightest and soundest. If you go to a nursery, be extremely careful what nursery you visit. There are some so unfavorably located and badly managed, that hardly a tree is fit for transplanting. I have been deceived in those even where the trees received the best of care, from the drainage being bad, and, as a consequence, many of the trees subsequently proved black-hearted. One of my neighbors, last year, procured trees from another neighbor near by, because he could have them very cheap. This man had enclosed a small patch of his poorest land, sowed his seed, and left the trees to take care of themselves. What could my neighbor expect from such a nursery? Whatever he expected, he was a terribly disappointed man. He thinks now he will send where he can obtain better stock. Again, what will prove hardy and succeed in one location will not in another. This is not only true of the apple but more especially so of the pear and plum.

Difference of climate, location and soil, however slight, will often make a marked difference in results. In order to be successful we must study our own climate, soil and location; observe, if possible, what our nearest neighbor has been successful with, and should our own soil be similar in character, then we have reasonable assurance that we shall succeed with the same varieties, provided we give like treatment.

As to the great number of varieties to select from, one need not be alarmed. It is a fact that out of some thirty-five hundred named varieties of the apple, only about three hundred are in general cultivation, and of this number not more than fifty possess any special value; and a visit to the leading markets will convince any one that only about half this number is comprised in the bulk of all that is sold. Thus the matter is not complex at all. If one confines himself to the old standards he will not be very much perplexed or very far out of the way.

## Culture.

The best way to plant and cultivate an orchard will vary with different persons. With some the roughest and stoniest land on the farm is selected, not because it is best adapted to fruit, but because it is not adapted to the raising of any other crop. In this case the warmest and sunniest land should be chosen, for it is useless to set out trees in cold, undrained soil. The cheapest mode of culture here will be to pasture sheep, no colts or cattle being allowed in the inclosure while the trees are young. Even with sheep the trees must be afforded some protection when first grafted, and until the scions are large and strong, for they frequently stretch up and pull or break the tender scions down. With others, nearly all their orcharding consists in setting out young trees on the borders of their fields or by the walls; and here, if they survive the depredations of the borer and the attacks of cattle, they do pretty well without much special cultivation. This is a very good and cheap way of raising fruit, and may be practiced to some extent, especially by those who cannot spare their cultivated fields. Whenever this plan is followed it must be borne in mind that greater diligence and precaution is necessary in order to insure success. The trees are more subject to the borer, to high winds and to the attacks of cattle. By staking the young trees well and strongly, mulching, manuring and watching for the borer, very good results can be obtained. There is, however, a liability to loss from the fruit falling on the walls.

One farmer, living not far from the city of Augusta, estimated that his crop of Roxbury russets—nearly all grown by the side of fences and walls—would have been one hundred barrels, but that through one of our autumn gales the crop was reduced one-third, if not one-half.

The best way, after all, if you can afford it, and I think you can, is to select the warmest, sunniest, richest and best drained land on the farm and plant in a body. The trees will grow enough faster on your best land to pay any loss arising therefrom, while the expense of cultivation is reduced one-half, and the crop results will be much larger. The word culture is used here in its broadest sense; it is not confined to the simple matter of stirring the ground, but implies manuring, mulching, pruning, applying washes, and the general care of the trees. It will be readily seen, then, that all this work can be more easily and quickly done when the orchard is in one place instead of being scattered about over the whole farm.

When apple trees are set by a wall or fence there is more danger from mice and witchgrass. If, however, they are thoroughly and constantly mulched the grass will be killed, and when completely dead there is no further danger from either enemy. Of the two enemies, witchgrass is the worst, and, unless subdued, it will ruin any tree. Some go so far as to say that it is utterly impossible to raise an orchard where this grass is in the ascendancy, but such an opinion is erroneous, for some very good orchards have been raised where the land was exceedingly infested with it. In such a case, however, the labor of producing an orchard was vastly increased, and only the most persevering efforts prevailed.

When our young orchards come into bearing, how shall we proceed? What shall we do to make them productive? The practices pursued may vary somewhat, modified by difference of location, the farm stock a man keeps, and the varieties of fruit he cultivates. People advocate turning swine into an orchard. Hogs are good scavengers; they will eat up all the wormy apples and root up the soil gloriously. This method of improvement will do very well for a small plot, but for a large orchard, embracing six, ten, or fifteen acres, it is out of the question. In many orchards sheep may be kept to great advantage. They are a source of considerable profit in and of themselves, and their droppings tend to improve the soil to some extent, though too much dependence must not be placed upon them, but other means of fertilization resorted

to or the trees will eventually suffer. When the orchard is wholly given up to sheep the trees should be heavily mulched with meadow hay. This practice is followed by several extensive orchardists in this State.

I was in conversation, not long since, with Messrs. J. Pope & Son, Manchester, in regard to this special feature, and they acknowledged that they had been compelled to resort, of late years, to extra means of fertilization, and had applied, to a limited extent, some of the phosphates. They have fifteen or sixteen acres of orcharding, and the pasture includes this and more than double beside, and with a flock of only seventy-five to one hundred sheep it is impossible to keep up the fertility from that source alone. I have seen orchards where too many sheep were kept, whereby the grass was fed down too closely and sterility followed as a natural consequence. We must observe Nature, and follow her plans to some extent. What keeps up the fertility of our forests? Simply the decay of the leaves, wood and other vegetable matter. The most vigorous forest is where there is the deepest mulch and the most shade. With our orchards, however, too much shade is not good. Apple trees should be far enough apart to let in a little sun in order to afford warmth to the ground and secure a larger size and a brighter color to the fruit.

One of the largest and most successful orchardists in Kennebec county follows Nature's plan in a part of his orchard. He neither mows the grass in it, nor pastures sheep, nor dresses it in any way artificially, but simply lets the grass die and rot on the ground each year. He says the standing grass affords sufficient mulch, and by rotting during the winter enough nutriment is afforded to keep the trees growing, and in good health. At any rate, the trees seem to be doing fairly well. Now, if a man has land enough, good nature enough, he can get along so first-rate, but it is a slovenly way of doing business. Some of the best New York orchardists keep the plow and harrow going nearly all the time—the main crop being fruit, and all others secondary—the main object being to stir the soil, but applying light coatings of manure, and occasionally seeding down to grass, but immediately feeding off the same to sheep or pigs preparatory to plowing again.

Another method is to top-dress an orchard, after it comes into bearing, every two or three years. In this way from one ton and a half to two tons of hay per acre may be cut each year, and the trees be made healthy and productive. A better plan still is to remove

the mulching in the fall and spread it over the ground to rot; bank up the trees with one or two bushels of fine manure or compost and let it remain till spring. When spring comes spread the compost or manure and re-mulch.

### Fertilizers and Their Value.

Muck, manure, lime, ashes, superphosphate, ground bone, and scraps of grease and bones from soap factories, are all sources and agents of fertility. They may be used singly or in combination with each other in such proportions as may be convenient to the purchaser.

We say that muck is chiefly valuable as an absorbent—and of course we mean dry muck—but this is a mistake, for, in reality, it contains a large amount of potential ammonia. According to the best authority, Professor Johnson, dry muck contains on an average 2.07 per cent. of ammonia. According to another good authority, Joseph Harris, the best and richest of barn-yard and stable manures seldom contain more than one per cent. of ammonia, and this authority thinks he is safe in saying that a ton of dry muck, on the average, contains, at least, twice as much potential ammonia as the average of our best manures. The nitrogen, or potential ammonia, lies dormant in the muck. If it was not insoluble as freshly drawn out it would have been washed out by rains and lost. It is there, however, and before the muck will yield up its nitrogen to plants it is necessary that it go through a process of fermentation and decomposition. I have used muck for thirty years, always in combination with other materials. I have generally used it combined with manure, ashes, lime, ground bone and sometimes other material. I plowed up an orchard once, part old and part new, of one acre and a half in extent. The orchard had been top-dressed twice quite heavily with muck and other materials, a lapse of two or three years occuring between the dressings; but the grass grew too fine and short, and the trees did not start much, and I got out of patience and plowed up the whole thing in the fall of 1877. Dressed a part of the ground with rich stable manure and a part with rich compost—compost made of 20 loads of muck, 2 casks of lime, 50 bushels of ashes, 300 pounds of ground bone, 10 barrels of grease and bones, and 1 cord manure, and after being thoroughly mixed with plow and fork, it was drawn out and put into two large heaps and left to ferment. When it was steaming hot it was

applied and the land sown to winter wheat. The compost covered about one acre, and the stable manure one-half acre. The following year, 1878, a good crop of wheat was harvested and the trees began to start. The land was again plowed and heavily dressed, nearly as above, and seeded down to grass with spring wheat in 1879. Have cut since, 1880 and 1881, two crops of splendid hay, as much as could be made upon the ground, and the trees have grown wonderfully. Some of the young trees bore so heavily that they had to be propped. All the old Russet trees—many of them on their last legs—bore apples nearly twice as large as formerly, and one old war-scarred Baldwin fairly groaned under its load of handsome fruit, some of the limbs giving way.

Joseph Harris, in speaking of manure for fruit-growers, says: "How to keep up the fertility of our apple orchards is becoming an important question and is attracting considerable attention. There are two methods generally recommended—I dare not say practised. The one is to keep the orchard on bare fallow; the other to keep it in grass and top-dress with manure, and either eat the grass off on the land with sheep and pigs, or else mow it frequently and let the grass rot on the surface for mulch and manure."

I do not like either plan. A better way is to apply the same amount of manure as in the case referred to, and let the grass mature and secure it for hay. In my own experience, covering several years, I have never failed to get from one ton and a half to two tons of excellent hay from all my orchards so treated.

There is no doubt that fine, well-rotted stable or barn-yard manure—the finer and richer the better—is the best fertilizer for orchards. It contains all the elements of plant growth that the special fertilizers do. Ellwanger & Barry, the great nurserymen, have been in the habit for years of buying large quantities of stable manure from the cities, and carting it out to their grounds, piling it in great heaps for fermentation, thus reducing three loads to one and bringing it, after a time, into a fine state for application to their nurseries.

### Neglect of Culture, and its Results.

There are more failures in orcharding from a want of proper treatment than from any other cause whatever. There is abundant evidence of this in nearly every neighborhood, among orchards both old and

young, in the poverty of the soil, in the pale and sickly leaf and stunted growth, in the want of protection from sheep and cattle, and in the neglect to prune and train the trees. These and other signs point unerringly to the cause of the trouble and to the coming failure. There is nothing, perhaps, which will bear harsh treatment like the apple-tree, or which clings so tenaciously to life; it is bound to live and grow if it has the shadow of a chance. There is nothing, too, that will respond more quickly to generous treatment, yet there are thousands of orchards literally starved to death. Many people seem to think that an orchard can take care of itself, and many others seem to think that orchard land is capable of eternal production.

Successful orcharding requires special thought, study and labor; this not in one direction, but in many,—for a good orchardist is not and cannot be a one-idea man. For instance, one man gets an idea that mulching is the great panacea, and he goes in for it strong, but neglects to prune, to watch for the borer, to guard against mice or bark lice, or to manure his trees, and of course he fails. Another gets the idea that pruning is the proper thing to do, and he makes a vigorous onslaught with saw and knife, and in one season does more damage than Nature can repair in ten. Another has read that plowing an orchard is beneficial—and so it is—but he goes in deep and strong, and in one year seriously damages an otherwise valuable orchard. The neglect to study and observe the laws of Nature in regard to fruit trees is just as fatal as neglect to cultivate properly.

This matter of the neglect of orchards is not a pleasant one to consider,—it has something of a personal nature, and it touches us all more or less. The majority of us have orchards, or are interested in them, and we know all about neglect; we have all suffered more or less from it; we do not like to be criticised concerning it. But let us look the matter bravely in the face and see if we cannot learn something to our profit, either from the errors of others, or from our own. Several instances have come under my own observation, of farmers who invested quite largely in fruit trees eight or ten years ago, and took considerable pains in setting them out, but neglected them so shamefully that they have now but a few scrubs left to remind them of their folly.

### The Rewards of Generous Culture.

I wish to turn your attention now to a more pleasing picture—to the success of those who, from small beginnings, have reached grand results—to those who, using sound judgment in the selection of the locality and the variety of the fruit, have persevered through many difficulties until victory has crowned their efforts. The few cases which I shall present are not altogether exceptional ones, for there are hundreds of others who have been proportionately if not equally successful.

You have all heard of Robert McKinstry on the Hudson; he has, perhaps, the largest orchard of any man in the country. He began more than twenty years ago, and, when his trees averaged twelve years of age, they produced 20,000 barrels of apples, and last year (1880) the crop was fully 40,000 barrels, a large share of which were shipped to Europe. He has 26,000 apple trees, 7,000 pear trees and a large number of cherry trees. He has 300 acres of land, nearly all of which is in fruit. The farm, large as it is, does not produce manure enough for this vast orchard, and it is kept in good condition by cultivation, horses plowing the spaces between the rows and oxen the strips between the trees. On the approach of winter a bank of earth is thrown up against the trees as protection. His winter varieties are R. I. Greening, Baldwin, King of Tompkins and a few Northern Spy.

The great Pell orchard was once a famous one (Mr. Robert L. Pell was the first man to export American apples to Europe), though now going somewhat to decay from want of proper care. He had 250 acres in orcharding, containing 21,000 trees, and raised mostly the famous Newtown Pippin. Another large orchard, and New York State has many, is that of Oliver Chapin and his son, Harry Chapin. There are nearly 6,000 trees, covering 125 acres, mostly Baldwins. They are planted thirty feet apart, and the cultivation has been so good that the ends of the branches nearly touch each other. For the first ten years he summer fallowed; after that seeded down and fed with sheep, plowing up every three or four years and manuring. The majority of the trees average twenty-two years. In 1879 a crop was sold from this orchard which brought some $17,000, or $135 per acre for the whole orchard. In 1876, the year of plenty, the crop brought $6,000. But the most productive orchard for its size was that

owned by Peter D. Miller, in Niagara county. It occupies eleven acres and contains 550 trees, or about fifty to the acre. They were set twenty-two years ago, thirty-one feet apart, and the branches now touch each other, and, in some cases, pass each other, and none of the trunks are less than a foot in diameter, and some measured fifteen inches. They were planted on the finest, deepest and richest land of the 100-acre farm; have been manured alternate years, and received the best cultivation.

Now for the results. In some years the fruit has sold for more than $5,000, and in twelve years the fruit brought, with the barrels, $32,000, or $20,000 net above all expenses. This would amount to $1,666 in one year from eleven acres, or over $150 per acre. What other farm crops will pay as well? But there is something more to it. Seven acres of the eleven were planted to Baldwins, and nearly all the profits came from the seven acres. Again, from 140 Baldwin trees, when sixteen years of age, (in 1875, the off year) there were produced 1,230 barrels, which, at $3.25 per barrel, brought $4,000—a splendid product for 140 trees. I could give other instances from that State did time permit. The little town of Shrewsbury, Mass., produced last year 30,000 barrels of winter fruit, mostly Baldwins. The majority of the thirty farmers in the town raise 400 and 500 barrels of apples each, and some of them as high as 600 and 800 barrels. In our own State there are several large and successful orchardists. The Pulsifer Brothers, Poland; Richard Plaisted, Gardiner; Messrs. Pope, Manchester; George Longfellow, Winthrop, and many others. Mr. Plaisted raised 900 barrels in 1879, and will have more than 1000 barrels this season. He keeps his orchard in good condition by liberal top-dressing. The Messrs. Pope raise 3,000 barrels this year, mainly Baldwins. Mr. Brown, also of Manchester, has a very large orchard which, in some seasons, brings him a large return. The Longfellow orchard is noted for its Roxbury Russets, and the proprietor always stores them until spring, when he reaps a rich harvest from their sale.

Here, let me say that I think the Roxbury Russet one of the most profitable sorts to raise where the land is suitable. "In Skowhegan there are two notable specimens of this variety, the oldest of which was planted in 1762. The tree is now seven feet from the ground to the branches, of which there are five in number, and all of which are very large and reaching out thirty-five feet in length,

covering a space of ground sixty-three feet in diameter. In those branches a play-house for children has been built for over half a century. The tree is more than four and a half feet in diameter, and has been a good bearer, from twenty-five to thirty-five bushels of apples having been picked from it each year. The other tree is about fifty years younger and a sprout from the old tree. It stands near the old one, is three feet in diameter, and perfect in every way." On our own place, in Hallowell, there stands a Russet tree—still in fair preservation and bearing good crops—which must be from seventy-five to eighty years of age. When in its prime, forty years ago, it was said to have borne thirteen barrels of good Russets in one year. We, ourselves, have taken from it in one year as many as eight barrels, and we have other Russet trees that have frequently produced, when in the prime of health, seven and eight barrels of good sound fruit.

Russets and Baldwins seem to be the leading and most profitable varieties for the middle counties of this State, though the Yellow Bellflower and R. I. Greening do remarkably well with some.

In closing, I will say that I have been pleased to note a tendency on the part of our farmers and fruit-growers generally to try less and less of the unprofitable sorts, and confine themselves to the standard and reliable kinds. And another thing I have noticed, the great number of fine young orchards which are springing up in many places, which are, or will soon be, coming into bearing. It is gratifying to know that our young men still have faith to plant trees, and that with it is a realization that more is needed than the planting.

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## SAGADAHOC COUNTY.

### INSTITUTE AT BOWDOINHAM.

The Institute for Sagadahoc county was held at the Town Hall, Bowdoinham, January 24. The day was the coldest for the winter, which interfered somewhat with the attendance.

The forenoon was given to a discussion of the subject of "Sources of Plant Food and Feeding for Manure," which was

opened by PROF. BALENTINE of the State College, and followed by the farmers present. The subject of "Economical Stock Feeding" was assigned for the afternoon and was opened by W. W. HARRIS of Cumberland, followed by G. M. GOWELL and others. In the evening G. M. WHITTAKER repeated his lecture given at South Paris, upon "Neglected Trifles." By invitation of the Grand Army Post this lecture was given at their hall, which was crowded to its full capacity.

A deep interest was manifested by those in attendance on this Institute, in the subjects under consideration, and complete freedom was exercised in asking and answering such questions as were suggested by the remarks of the speakers, or had presented themselves for solution in the every day practices of the farm.

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## ANDROSCOGGIN COUNTY.

### INSTITUTE AT POLAND.

By invitation of Excelsior Grange, Poland, the Institute for this county was held at their commodious hall. The day was characterized by deep snows which high winds piled in deep drifts, rendering the highways impassable till teams had time to break them down into passable pathways. Notwithstanding these unfavorable conditions a large assemblage of the farmers of Androscoggin county, and their wives, gathered at the place of meeting to participate in the exercises. Though so snowy and unpleasant without, all was pleasant and comfortable on entering the hall.

C. H. COBB, the member of the county, called to order and introduced Mr. B. F. Cobb, master of the grange, who welcomed the Institute, the speakers and the many visitors to the place of meeting, and also extended, in behalf of the grange and the citizens, hospitality to all. Dinner and supper were provided by the matrons in their dining hall, and entertainment for the night at their homes.

D. W. PULSIFER, the champion fruit grower, made an exhibition of fine specimens of the leading winter fruits grown by him.

In the forenoon Secretary GILBERT gave a familiar talk upon "Sources of Fertility," accompanied with charts for illustration, which was followed by discussion, questions and answers, till the hour for dinner.

## AFTERNOON.

### THOROUGH WORK IN FARMING;

BY A. W. CHEEVER, Editor of New England Farmer.

In taking up the subject assigned for discussion at this hour, "Thorough Work," in its application to all farm operations, the first question which arises in my mind is not, what can I say, but what can I leave unsaid and feel at the close that my work in treating this subject has been performed in a thorough manner. Thorough work, of whatever kind and in whatever department of industry, means the very best kind of work, within reasonable limits, of which the operator is capable. A distinction, however, must be made between fine work and good work. Painting an ox sled or a manure cart with plain paint and oil may be a piece of good work. The artist who mixes and spreads the paint may be capable of covering these vehicles all over with fine pictures, but fine pictures here would be out of place and do no credit to the workman. The best work is that which best answers the purpose for which it is done.

I worked one summer, when a boy, on a farm owned by the Hopedale Community, in Milford, Mass. Every Monday evening Rev. Adin Ballou, the leader of the community, gathered the young people of the village together in his parlor, or that of some friend, and gave a short, friendly and fatherly talk upon some subject that should be of interest to young men and women just starting in the earnest struggle of life. One evening his topic was "Thoroughness," and he said so much about the necessity of doing all farm and garden work in a thorough, workmanlike manner that I, being the only farm hand present, thought he certainly meant his lesson should apply to my own case specially. He told us that, when ploughing a field, we should endeavor to leave every pound of the soil of that field, to the depth the plow was set to run, turned and

pulverized with uniform thoroughness; to have the furrows of uniform width, of even depth, well and completely turned at the ends, and with no balks anywhere. In order to do such work the team must be treated kindly, driven steadily and made to go out straight at the ends. If there were rocks or stumps in the way they must be worked around with extra care to avoid breakages, and to do the best work possible under the circumstances. It was a lesson I have never forgotten, and I rarely follow a plow a half hour without recalling something that was said by Mr. Ballou to the young folks gathered at that Monday evening "Inductive Communion."

Were I to select any single farm operation for the subject of an entire lecture I think it would be "ploughing," for good ploughing is at the very foundation of all successful tillage, and yet there is comparatively very little first-rate ploughing done. A very large proportion of the cultivated land in New England never can be ploughed well until it is first put in condition fit for the plough. In a new country, just cleared of its forests, first-class ploughing is not to be expected, but after these two hundred years of working among stumps and rocks is it not about time to get ready to do some good work?

Now, if farmers could be made to believe that more net profit can be derived from one acre of first-rate tillage land than from two acres of the same kind of land in its rough state, it would seem that little urging would be required to mark the beginning of a radical change in our methods. My opinions in this matter are founded on experience, for my boyhood days were spent on one of the rockiest and most difficult farms to work there were in my county. It consisted of some fifty acres of tillage land divided by heavy stone walls into fields averaging less than two acres each. The stones for these walls were the spontaneous products of the fields fenced. No foreign importation here, and yet after digging enough stones for such an amount of fencing, the rocks which were too large to handle without breaking were scattered more thickly over the fields than the hay cocks had ever been at that time. Nor was there a single field upon the whole farm that did not, somewhere in it, have a low, muddy hole that could never be ploughed and worked when other portions of the field were ready.

My father did the best kind of work he knew how to among those rocks, as boy and man, over fifty years, and I drove oxen and saw the water follow the plough behind the upturned furrow for nearly

twenty years before the conclusion was reached that it was about time to begin to do some good work. The rockiest, wettest and most distant fields were given over to forest growth, or turned into pasture, while the work of improvement commenced near the buildings and gradually extended outward like the spokes of a wheel. The wet land was ditched and the surface rocks broken up and used for filling the ditches, making drains that have done good service already about thirty years, and bid fair to continue effective for many years yet to come.

The hundreds of rods of stone walls were also buried in the same way, some right where they originally stood, while others were hauled away and used where they were more needed, or where the digging for their burial would be easier.

About twenty-six acres have been gone over in this way, allowing the plough to turn unbroken furrows sixty rods in length and all other farm machinery to run in all directions uninterruptedly. As each section was brought to the plough one or more hands were employed to follow the team with crowbars and dig out all cobble stones started by the plough. This left the land in very fair condition to begin use as farm land. I have recently commenced the use of a light, steel, subsoil plough, which does not invert the soil, but loosens it to the depth of about twelve inches. As it is run in old ground without preceding it with any other plough, a cultivator will perform all needed subsequent cultivation during the season, and the expense is scarcely more than for ordinary ploughing. As the result of this thorough work, in preparing this land for use, the twenty-six acres are now producing food for keeping about three times the amount of stock that was formerly kept upon the fifty acres, while the removal of fences and rocks makes it possible to use improved implements by which the cost of working the soil and tending and harvesting the crops is reduced at least one-half.

The breaking up of a grass field, reducing it to a fine tilth by planting and cultivation and again seeding it down to grass, was formerly an operation much to be dreaded. The numerous rocks made cross-ploughing almost a necessity. No field could be well ploughed the first time going over. Cross-ploughing left a rough, ragged, turfy field to plant and cultivate the first season. Planting two years in succession was also a necessity, and potatoes must be the first crop, as corn was too impatient on such coarse, rough fields.

A great deal of hard hand labor was required in hoeing crops upon land so poorly fitted for cropping by previous cultivation.

There may be one drawback to the onward course of improvement in our methods of cultivation. I fear the farm boy of the future will miss the significance of the sentiment contained in that song written to encourage the young farmer sweating away under the burning mid-day sun, to "hoe out his row," even though the dinner horn echoes have already died away on the distant hillsides, particularly if his row happened to be the outside one and next to a briar-covered fence. Were I to handle such fields now as I worked on thirty years ago, I think I should not plant them to field crops which would require hoeing, but would summer fallow and work the soil over as often as required with plough and cultivator. I could not afford to cultivate such rough land in those old-fashioned ways with Western competition staring me in the face. If we are to hold our own here in New England against the competition of those farmers who have large, smooth fields to work, we must make our fields larger and smoother, so that we too can use the improved implements and machines.

If good ploughing is at the foundation of good tillage, it must be very important that good ploughs be selected for the work. It would be impossible for me to name any single plough that I could call the best, but I can say that I do not see how any of the old fashioned land-side ploughs can be made to do thorough work unless that work be to throw the land all into ridges with surface drains between. I have known many farmers who were at first prejudiced against swivel ploughs, but have known very few who would take a land-side plough after getting a good swivel and learning the use of it.

The "Matchless Swivel," made by Everett & Small, Boston, is well known by many Maine farmers as the successful plough at public trials in this State, but it should be known by ten farmers where one knows it now. The "I. X. L.," by Parker & Gannett, the "Centennial," by the Ames Plow Co., the "Charter Oak," by the Higganum Co., and the new "North American," by Smith, Whitcomb & Cook, are all good ploughs, each having some special merit adapting it to certain kinds of soils. Either of these, and probably others made in your own State, though with which I am not familiar, will do work that will satisfy a thorough man many

times better than any plough that leaves a field as billowy as the ocean.

The best plough, however, requires a ploughman to follow it. A good ploughman can do better work with an inferior plough than a poor workman can with the best pattern yet made. A ploughman will know how to trim his plough and hitch his team to it in such a way as to get from it its best work. He will have his chain so long that a mis-step of the team will not necessarily spoil his work. He will then adjust his wheel so that the furrow shall be of even depth through hard soil or soft soil. His cutter will be set to aid rather than prevent good work, and as the point grows dull he will let the plough down by raising the wheel. Too many farmers hitch to an implement about as it leaves the hands of the manufacturer, and wear it out or break it without ever learning the special uses of all its parts. Good ploughing calls for straight furrows, and if a field is ill-shapen the nooks and curves should be ploughed by themselves, which is an easy thing to do with a swivel plough. I have seen a team plough around a field so disfigured by ledges, or small streams, that the outside furrow described as many curves as the letter S, and the subsequent furrows all followed the course of the first. Good, thorough work can never be done except by turning straight, uniform furrows.

If a field be well ploughed, whether it be in sod or stubble, the subsequent work of the harrow will be easy and simple. No turning back of tough sods and no endless tramping round and round in the vain endeavor to complete the work which the plough had failed to do. I have sometimes planted corn immediately after the plough, dropping the seed by hand in every third or fourth furrow and covering with a hoe, and had the planting all completed before the team was unhitched for their dinner.

To drag an old-fashioned, straight-toothed harrow over and over a field till the tramping of feet has made the soil almost as solid as before ploughing, is not in accordance with my ideas of good harrowing. On land that is put into good condition for cultivation the old-fashioned heavy harrow is as much behind the times as would be the wooden mould-board plough of our grandfathers.

The modern pulverizing harrow, with its twelve or more sixteen-inch steel discs, is as great an improvement over the old harrows as is the light garden hoe over the clam shell the Indian used three

hundred years ago to dig the holes for planting his corn. The disc harrows require no roller to precede them to press the furrows so they will not be hauled back, for the harrow is a roller and pulverizer combined. It is furnished with an easy seat for the driver, and, as the discs are constantly revolving, the draught upon the team is less severe than is required for older forms of the harrow, without the weight of the driver, or which covered much less width in its passage.

With such an excellent implement for pulverizing the soil no farmer, who desires to make thorough work in the field, need make any apology for half-performed work. Adopt this rule and your fields will be in good condition to receive whatever crop you may desire to grow. Harrow till you are sure you have made the soil as fine and mellow as it need be, then harrow it all over once more.

It used to be the custom to plough and cross-plough, harrow and cross-harrow alternately, and if a field is level and nearly square there is no objection to such a practice, but I find it a great saving in labor to have my fields as long as they well can be. A great deal of time is foolishly spent in small fields turning corners, and I have found that, with good implements to use, such as the swivel plough and the disc harrow, quite as good work can often be done if they are worked continuously in one direction instead of crosswise as was the old custom. If, upon a side hill, the disc harrow fails to leave the surface as smooth and level as is desirable, a smoothing harrow is drawn once over the ground which leaves it as smooth as if the previous cultivation had not been all in one direction. If the field be a recently turned sod and the soil is inclined to clay so that a good deal of work must be done by the harrow in order to secure a fine mellow tilth, the team may be driven lengthwise of the field, but at a slight angle, diagonally, first one way then the opposite. This will require less turning than driving directly across a narrow field, while the pulverization will be quite as perfect.

Thorough work in the hoed field calls for straight parallel rows, and if the seed be dropped and covered by a planter this uniformity is not difficult to attain. The machine should have a light bar or joist bolted across it from the ends of which light chains are allowed to drag and mark the succeeding rows. It is sometimes desirable to harvest one or more measured rods of a certain crop,

by which to estimate the yield of an acre. If corn, potatoes or other crops are planted in rows five to the rod the measurement will be greatly simplified. This will require the rows to be three feet three and three-fifths inches apart, a distance that has been found by many to be a very good one for either corn or potatoes.

The wheel planter, in the hands of an experienced workman, will plant equally well to the best hand labor, but it requires that all the previous work shall have been thoroughly performed. Rocks, cobble stones, stumps and clods must be removed or reduced. Thorough previous work also greatly facilitates the hand labor of planting and hoeing. On mellow soil, potatoes, and even corn, may be covered neatly by drawing a brush harrow over the field across the furrows. This method is practiced quite extensively by farmers who have already got their cultivated land into good condition for cultivation.

Weeding and hoeing field crops is a kind of work that is often done in a most slovenly manner. The best way of doing almost any kind of work is quite often the cheapest way. Previous preparation saves a great deal of after work in hoed fields. The more work that is done in the way of fining the soil and sprouting and killing seeds before planting the easier will be the weeding and hoeing after the plants come up. Every field should, if possible, be worked over with some pulverizing implement the very last thing before putting in the seed. Thousands and millions of weeds that are just sprouting may sometimes thus be destroyed, saving a great outlay of hand labor in the future.

I find it a very common mistake among farmers to work out a hoed field with horse and cultivator immediately before going in with the hand hoe. A much better way is to cultivate the field after the seed is planted just as soon as the weed seeds begin to start, not waiting for the corn, potatoes or other crops, to be large enough to hoe. Then, in a few days, go through again with the cultivator, or horse hoe, in the opposite direction, if the field be furrowed or checked both ways, and repeat the operation at intervals of a few days through the entire growing season. The few weeds left near the crop may be pulled out by hand or cut out with small, sharp-cornered, light hoes at any convenient time, for, under such a method, fair weather for hoeing is not absolutely necessary. The hoe will be directed only to the live weeds which will be left

where the subsequent use of the horse hoe or cultivator will prevent them from getting a permanent hold upon the soil.

The old-fashioned methods of hoeing have been almost entirely abandoned by all the progressive farmers and gardeners everywhere. It requires too much useless and costly labor, while the fields are not kept half so free from weeds. I have found the slanting, steel-toothed, smoothing harrow a great aid in cultivating fields of corn and potatoes. It required some courage to commence its use, but I find my courage increasing with each season's experiment. Last summer I drew the smoothing harrow over my corn field at two different times before the corn was six inches high, letting it lap half each time, and I propose to use it still more freely the coming season. But the use of this valuable labor-saving implement requires the land to be previously well prepared, fine land and reasonably free from lumps and loose sods which might be dragged along under the harrow to the injury of the crop. The corn, or other seed, should also be planted slightly below the surface level. Corn planted in high hills upon stable manure would be likely to suffer seriously under the smoothing harrow, but if the previous work be done as it should be it will save a great amount of hard hand labor and greatly cheapen the cost of the crop. The harrow must also be used early in the season, just as the weeds are starting, or before they get a firm hold upon the soil. When the weeds have attained considerable size they will endure the harrowing equally well with the corn. After all has been done with the smoothing harrow that can be, the horse hoe or cultivator should be used between the rows. If this be used first the soil may be made too light and mellow for the safe working of the smoothing harrow.

How many times a corn field should be cultivated during the growth of the crop is a question for each farmer to decide according to his own best judgment. It is my practice to go through the field almost every week till the crop is in danger of injury from further cultivation, and if heavy rains beat the ground down hard, forming an impervious crust, I go through even oftener.

Another operation, that is often done in a very slovenly manner, is the seeding down of mowing fields. If good ploughing lies at the foundation of good tillage, then thorough work in seeding lies at the foundation of good mowings. Rough, coarse, turfy land, covered by cobble stones, at the time of seeding, will make a very poor field to work with a mowing machine, and a farm, in these

times, that must be mowed by hand, is worth scarcely half price. A good mowing field is one that is clear from all surface obstructions, has been thoroughly ploughed, heavily manured, and the whole upper portion of the soil made as fine and mellow as if for an onion bed. It should be worked over till every living weed has been killed and most of the weed seeds destroyed by sprouting. A newly seeded field coming up thickly with sorrel, Canada thistles, or witch grass, is a disgrace to the name of mowing field. Young grass, when it first starts, is very small and tender, and if it has to fight its way against rank growing annual and perennial weeds it must make but slow progress. One cannot afford to give his land over to the production of worthless weeds. Many farmers appear to take no note of weeds, except when they grow in the garden, or among hoed crops of the field. Thorough work calls for the suppression, or better, the extermination of most of our worst weeds from our land. Of course, it can be done, and before the world is cultivated as it should be, it will be done. A great many farmers, I am inclined to believe the majority of them, seed down their mowing lands without the use of the roller. I should as soon think of laying down a field without sowing seed as to think of seeding without finishing it off with the roller.

There may be occasions when work may be slighted. I have seeded a field and found a storm coming on before there would be time to pick up and cart off all the small, loose stones. In such cases I have sometimes rolled the land as best I might and left the stones to be picked some months afterward. It injures a newly seeded field, very seriously, to tramp over it immediately after a heavy rain, but in favorable weather a smooth surface, free from small stones, should be secured, so that the mowing machine can run without danger of dulling or breaking.

A farmer entering a heavy field of grass with his mowing machine needs to have faith that the land is smooth and free from obstructions; then he can drive ahead with confidence. I have done considerable mowing for my neighbors and know something of the cost of carelessness and neglect in these matters. A stray shingle, with a nail in it, caught between the guards and tore out one of the sections at a time when it was very inconvenient to make the repair. A small apple tree was cut down, leaving a stump just high enough to catch the cutter-bar. The team was walking fast and the result was a broken pole and two days' delay

and an additional expense of two or three dollars. It would not have cost one mill more to have cut the tree an inch or two closer to the ground and thus saved the trouble and vexation of a breakage in the midst of the busiest season of the year. A single, sharp stone, sticking just out of ground, but sufficiently high to catch or dull the machine, is much more to be dreaded than the large, smooth rock that is in plain sight.

Every mowing field, that is not known to be perfectly smooth and safe for the machine, should be looked over carefully every season early in spring before the grass gets high, or immediately after haying, and all the small stones brought up by the horse rake, or tedder, picked up and carried off. Such trifling jobs cost very little compared to the saving they may make.

To any one, who is naturally orderly and systematic, there is great satisfaction in seeing a piece of work done well. I have seen the smoothest grass fields mown and raked in a manner that was positively disgraceful. The machine was evidently dull, or some of the cutters missing, or they were all worn so short that they dragged over much of the grass, or cut it several inches from the surface; the team was also driven very carelessly, dodging in and out, and leaving corners uncut, while a good workman, with a machine kept in order as a machine should be, would have left a stubble equalling the handsomest lawn. Thorough work always pays in the hay field. To be in its best condition, hay needs to be cured rapidly and uniformly. According to my own experience, not more than one man in five will open hay in a thorough, workmanlike manner, being careful to take up all the wet, green locks at the bottom of the cocks and lay them up to the sun and air, nor will more than one out of ten quickly and neatly rake the load before sending it to the barn, so that the scattering locks shall not strew the road with a carpet of good cattle food. There is, however, a great difference between a thorough workman and a putterer. I have seen a bricklayer turn a brick as many ways as it had sides before being sure which side should be the face, and I have seen other men pile coarse cobble stones into a pretty handsome wall and rarely fail of selecting the right stone and placing it the best side out the first time. It requires good judgment to know just how thoroughly it will pay to do any piece of work. Last spring I ordered a half bushel of seed barley of a new variety, paying a high price for it. When it arrived I found it very badly

mixed with buckwheat and weed seeds. It was worth more to clean that seed than I paid for it, yet it was worthless to me as it was. I would not have sowed the foul stuff for the price of a half dozen such lots. It was all the result of carelessness in letting grain get mixed in harvesting, threshing and winnowing. The man who will let his seed grain get mixed up with everything he ought to keep it free from, has failed to learn the first rules of good farming.

The time is fast approaching when more thorough work will be called for in our orchards. The mere planting of trees and then leaving them to be preyed upon by insects till the crop is fit only for cider is anything but good farming. In all other vocations men are endeavoring to improve, or to cheapen their products. The standard of excellence is being constantly raised. The same quality of goods that would sell a few years ago are now passed by. Thorough work, in the orchard, now calls, not only for healthy trees of well-selected varieties, a rich, well cultivated soil and good judgment in trimming, but it also calls for the destruction of injurious insects and a judicious thinning of the fruit. A single barrel of large, perfect fruit will find buyers at a paying price when small, wormy, bruised stock would scarcely be taken as a gift.

A great deal has been written, in years past, in favor of thoroughbred animals, but there is beginning to be a distinction made between thoroughbred stock and thoroughly good stock. Greatness without goodness, either among animals or among men, does not count as it once did. The popular cow to-day is not the one with the longest pedigree, but the one that can fill the deepest pail and show the largest butter record. As farmers and breeders, we seem to have but just begun to realize the importance of thorough work in the line of breeding. We must select our best animals for breeders and weed out the inferior stock most severely. If every farmer would follow such a course, for only ten years, the general improvement in stock throughout the country would be very marked.

There is a chance, too, for much improvement in the direction of feeding and caring for our animals. One well fed and well treated animal will often pay a larger profit on the investment than two or three half starved, neglected creatures. Feeding just enough to sustain life is the most expensive method of feeding one can conceive of, for there is no return whatever for the food and

labor expended. "Store" pigs and "store" cattle, kept as such, are the most expensive boarders a farmer can keep. Thoroughness here requires that every animal shall be fed all the suitable food it can thoroughly digest and assimilate. Anything less than this tends toward waste. But it will not do to over feed. An animal should always take hold of its regular ration with a good appetite. Do not leave rejected food before any animal long after they have had enough. Keep the feeding places reasonably clean.

The time is rapidly coming when farmers will be required to understand more concerning the laws of animal nutrition than they have done in the past. Animal bodies and the food of animals are made up of certain elements, and it will pay us to learn in what proportion those elements are found in different foods, so that we may be able to feed without waste. Manufacturing has been carried to so fine a point, in some directions, that the chief, or only profit to be derived from the business is from the utilization of what were formerly waste products. The same condition of things threatens the farmer, and he must learn how to avoid the small, as well as the large sources of waste. Perhaps there has been no greater waste in any department of farm industry than in the dairy. For want of a better understanding of the business and a closer attention to the details of management the net income from our dairy herds has failed to reach one-half its reasonable possibilities. We keep inferior cows and raise from them inferior calves; we feed inferior kinds of food in winter and turn into poor run-out pastures in summer; we let our cows suffer from heat in summer and from cold in winter; we water them in filthy mud holes, and from troughs half filled with ice; we let them lie in filthy stables and allow too much filth to mix into the milk; we set the milk in hot closets, in summer, where it will sour before the cream is half risen, and in winter quite as much is lost from too much cold; our butter is soft, oily, and soon rancid in summer, and white, brittle and bitter in winter, while the skimmed milk, which has a higher food value than the cream taken from it, is allowed to ferment and waste in filthy swill-barrels before it is finally thrown to the hogs. Certainly there is more thorough work needed in this direction when the average cow makes but a hundred pounds of poor butter per year, bringing less than twenty-five dollars, while the good cow, in the hands of a good dairyman, will yield two hundred pounds of good butter which will sell for seventy-five dollars.

I have spoken of the benefit to be derived from the improvement of animals which we are breeding. There is also a wide field open for improvement in the character of our grains, vegetables and fruits. It is not the thorough farmer, but the careless one, who is compelled to change his seed corn, his wheat, his oats and his potatoes. We have yet much to learn as well as much to do in this matter of improving seed of all kinds. There are farmers who have kept the same variety of seed corn for nearly a half century, improving it a little from year to year. I know farmers who have kept the same variety of potatoes for fifty years without showing any tendency towards "running out." I know gardeners who place so high a value upon thoroughbred seed that they will trust no one to grow seed for them. I know cultivators of cucumbers who are so particular about seed that they take the necessary trouble to cross their two best plants artificially, protecting the blossoms from interference by insects with a cover of netting, and their two best plants are determined by a record kept of the exact number of cucumbers each plant has produced.

Before we can begin to feel that, as farmers, we are thoroughly masters of our business we have a great deal to learn. The accumulated knowledge of the whole world would fill a very large library, but a mere index of what is not known would make a larger volume than has ever yet been printed. We want to know more about breeding and feeding animals, and especially how to keep them healthy and how to restore them to health when sick. We want to understand better how to improve our cultivated plants, and how to protect them from the depredations of insects. There are thousands of species of insect life which almost threaten our very existence and yet over which we have very little control. We need to learn to observe more closely, to look at a subject upon all its sides, to take account of all influencing conditions, and to guard against hasty and unjust conclusions. In short, we must, as farmers, be more thoroughly in earnest, be more honest with our land, with ourselves and with each other. Individual effort, well directed, will accomplish much, but combined effort much more and at a far cheaper rate. So, while we should endeavor to become good farmers and thorough scholars, individually, we must not forget the claims of the school, the college, the experiment station and the agricultural association under whatever name it may be known.

DISCUSSION.

C. H. COBB: The matter of thorough work in ploughing and in the further preparation of the land claims far more attention from the farmers than it receives.

S. S. SMITH: The old adage is not a bad one, that "what is worth doing at all is worth doing well." Come to look at it, is there economy, when clearing a field, in doing a little only at a time, and then after we have ploughed around rocks and backed up for stumps and roots for many years, after all be obliged to go to work and thoroughly finish the work, while, had it been done in the first place all this interference and all of this imperfect work for these many years, would have been avoided and better paying results secured. Many little things are small in themselves yet mighty in the aggregate of losses when neglected.

Mr. RIDEOUT of New Gloucester, said he had been asked many times why his corn grew faster than many others'. It was the thorough pulverization given the land, and not heavy manuring. There must be "thorough work."

DANIEL FIELD, Danville Junction: In the handling of a clay farm, devoted chiefly to grass production, I practice ploughing and preparing the land in autumn and seeding with grass alone in early spring. Thorough preparation is of utmost importance and must be complete that the young grass plants may have a mellow and fine bed for their roots.

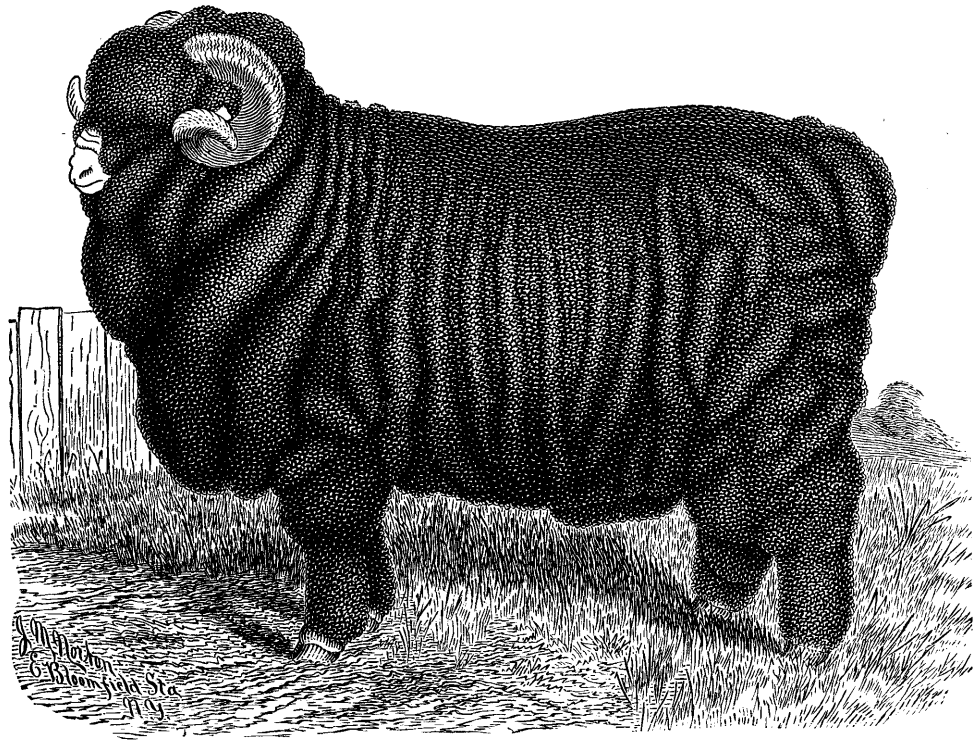
F. C. MERRILL, South Paris, asked the lecturer if he had used the smoothing harrow on any crop but corn.

Mr. CHEEVER: Yes; on potatoes. The potatoes were planted below the surface of the land, and, in going over the field the first time, no potatoes, of any account, were disturbed in the hill. A second harrowing appeared to disturb more, but at digging time no miss hills were found.

Mr. NOBLE of Poland: I have no hesitation in saying that broadcast harrowing of corn or potatoes will not disturb the plants to any injurious extent.

## EVENING.

On assembling in the evening Mr. B. F. COBB asked for an explanation of the work of Experiment Stations and the results secured by their establishment. Replied to by the Secretary and Mr. CHEEVER.



BANKER, JR., OWNED BY E. G FARNHAM, Shoreham, Vt

The regular lecture of the evening was given by Prof. G. T. FLETCHER, of Augusta; subject, "Country Schools," after which thanks for kindly attentions were expressed by the recipients of the same, and the Institute was declared adjourned.

## KENNEBEC COUNTY.

Arrangement was made with the Kennebec Agricultural Society to hold an Institute at Readfield, February 9. The roads were impassably blockaded with snow in the forenoon, and only a small number were able to assemble in the afternoon. The programme was not carried out, in full, the lecture by Mr. CHEEVER, of the New England Farmer, previously given at Poland, being the only one given. A postponement was made to another day, only to encounter a worse storm than before, the roads being impassable for the day. No further appointments were made for this county.

## FRANKLIN COUNTY.

The Franklin County Institute was held at Farmington, February 14, at the Supreme Court Room. The Sandy River Railroad granted the courtesy of reduced fares, which brought down a large delegation from the upper part of the county. These, with the attendance from Farmington and the surrounding towns, made up a large attendance and an enthusiastic meeting. T. B. HUNTER, Vice President of the Board, called to order, and introduced S. R. LELAND, President of the Franklin Central Agricultural Society, who gave an address of welcome to the Board and the visiting farmers, followed by a most appropriate glance at the leading features of the agriculture of the county, and closed by saying that "perhaps there was no branch of farming carried on in this county that will give so large a margin of net profit as sheep raising. With the large area of natural grass land and the luxuriant mountain pastures, it is a region peculiarly adapted to that

particular industry." Immediately following, a lecture was given on

## MERINO SHEEP.

By HENRY LANE, Cornwall, Vermont.

I do not believe as did a certain advocate of merino sheep when, a few years since, he used this remarkable language: "Fine-wooled sheep may be kept wherever industrious man and intelligent breeding exists." I think it is true that no race of animals has a more extended range of habitation or consume so great a variety of vegetation as sheep, and no other sheep will endure the vicissitudes and extremes of climate and weather, under as great a variation of locality and food, as well as the merino; but, however pliant may be the constitution of this breed, there are geographical limits out of which it does not thrive. There are localities more congenial to its habits, where it is most vigorous, and in the hands of skillful breeders, has been improved nearly to perfection. A low, level country with a humid atmosphere, and with a moist, luxuriant soil, is not suited to the merino; but on high, dry, warm, rolling lands is his natural home. The general rule that may be laid down, limiting the home of this breed in this country, is between latitudes of 30° and 45°. Certain high altitudes south of 30° and low altitudes north of 45° may be favorable. Lands less than two hundred feet above the ocean, or within fifty miles of the coast, are generally not well adapted to these sheep. The merino is an upland sheep; the nutritious herbage of elevated table-lands, dry, warm, rolling pastures, lofty hill-sides, are well adapted to it. They love to browse among bushes, about rocks and steep declivities.

The American, or improved merino of to-day, is so unlike the sheep imported from Spain, or so unlike those of forty years ago, that one not acquainted with the rapid improvements made within this time, and more especially in the past twenty years, can hardly realize what the merino sheep of the present are. Nearly forty years ago selections from some of the best flocks of merinos in the country came into the possession of Hammond and a few other breeders, who, by years of close attention to the true principles of breeding, aided by the natural advantages of location, soil and climate, have, in the Vermont merinos, accomplished what has not been accomplished by the breeders of any other State or country. To illustrate the rapid march of improvement, look at the increase

per cent. of wool to live weight in seventy years. In 1812 the best rams produced but about 6 per cent.; down to 1844 it had increased to 15 per cent.; 1865 to 21 per cent. During the past sixteen years it has increased very rapidly to 22, 24, 30, and even 36 per cent. "There were forwarded from Vermont to the Paris exposition sixty-seven fleeces selected for fine style and quality of wool as well as weight of fleece. The per cent. of wool to live weight for the whole number was 22; of the best thirty, 25.2; of the best six, 30.1; the best one, 36.6." Twenty-one of the sixty-seven were rams, forty-six were ewes.

The gain is not as great in whole flocks, but the wool-bearing proportion has been increased nearly, or quite, three times. They have increased in size since their importation from Spain. A great change and improvement has also been made in their build, appearance and beauty, with greater vigor of constitution.

The general impression among breeders, not acquainted with the facts, has been that, with the increase, in size, vigor and wool-bearing capacity of the improved merino, there has been no improvement in quality of fleece. The actual facts are that there has been marked improvement in this direction. In Hammond's day it was thought, by observing breeders, that the hight of improvement in this breed had been reached, but his examples, teachings and improvements have helped a younger class of breeders, by sound judgment, close observation and diligent care to develop greater improvements than have ever been made in the same time in the history of this breed. Hammond's name goes down in history with those of Bates, Collins, Bakewell and Attwood as an improver of a breed. Hammond has truly been called the Bakewell of America. I don't know of a merino flock in Vermont that has not some strain of the Hammond improvement, and were improved by it. The Rich flock, now owned by Virtulan Rich, Addison county, Vermont, is said to be the "oldest flock of pure-breed merinos now existing in the United States without changes of ownership except by regular descent. It has been kept on the same farm, and owned in the same family, for three generations, or a period of fifty-six years, no other ewes having been added to the flock." It is somewhat questionable if this superior flock would now rank with other good flocks in the country if it were not for an infusion of new blood by selecting a sire from the Hammond improvement.

Stickney is another breeder whose "flock has been kept together, and bred by one person, for a period of over forty years, and the aged proprietor * can point, as evidence of the improvement effected by him, to his ram Consul, from the Jarvis flock, bred in 1835, shearing about 14 pounds at his best, and to Fremont, shearing 34 pounds and 14 ounces in 1868, and producing for nine years fleeces averaging 27 pounds 1 ounce—a total of 243 pounds." Ewes from this flock were taken to Hammond's Sweepstakes, Silver Mine and Gold Drop. The Publishing Committee of the Vermont Sheep Register say that "we believe that there is scarcely a stock ram of any note in Vermont that does not in whole, or in part, trace its pedigree to the Attwood flock," and mostly through Hammond.

Let us look more minutely at what Vermont breeders have accomplished and the direction of their present efforts at improvement.

### Size.

The size of the Vermont merino has been increased somewhat since they were first brought into the State, but not nearly in the same ratio as in the weight of fleece. Rams, at that time, weighed from 100 to 110 pounds, and ewes from 70 to 75 pounds. These weights have been increased, probably on an average of about twenty per cent. The small sheep, with equal length and thickness of fleece, on account of greater proportionate surface, will produce the largest per cent. of wool, and the tendency, a few years ago, was to sacrifice size to per cent. of fleece. It was found that some small shapes were yielding a larger per cent. of wool than their size and constitution would warrant their sustaining, consequently breeders are now breeding to gradually increase the size. It is believed that this can be done without sacrificing any of the good qualities already attained. Vermont will never be able to produce large merinos. The conditions are unfavorable for this. It is true that when our sheep, after reaching mature age, are taken to any section of our country outside of New England, they will increase in size. This is claimed by sheep breeders in all States south and west of us, and admitted by Vermont breeders. While Vermont can produce a stocky, thick-set carcass, the West and South will produce more length of body and leg, a more rangey and larger

*Now deceased.

sheep. The same cause may produce this difference that produced the difference in build of men raised in separate sections of our country. The average size of all the soldiers that enlisted from Vermont, during the late civil war, was one inch larger around the chest than the average of all the soldiers from Kentucky, while the Kentucky soldiers averaged one inch taller than the Vermont soldiers.

Our breeders prefer a medium-sized sheep with a round, deep body, short, thick neck, broad, straight back, square buttock, straight from the tail to the hoof; length, from nose to tail, 3 feet to 3 feet 8 inches; height to top of shoulder, five-eighths of length; depth of body from 2½ to 4 times the length of leg. Our soil and climate favor the production of this build of merinos.

## Oil.

The large per cent of wool to live weight that is now produced is cause of astonishment to some persons, and when these twenty-five to thirty per cent. fleeces are cleansed and produce only from seven to eight per cent. they say, why not produce the same amount of wool with less oil; that it must take a certain amount of food to produce this oil which, in the end, is of no benefit whatever, and is only waste; and some, from ignorance, imagine that while it is useless it is also detrimental. In answer to the objection to so much oil in the merino fleece, I will say that the best breeders do not believe that as profitable a fleece can be raised without a large amount of oil, although they do not propose to increase the amount only in the same ratio as the amount of wool is increased. I think it is true that the per cent. of oil to wool is no greater than it was twenty years ago. Oil promotes the growth of wool. No breeder has been able to produce a heavy cleansed fleece without oil. Breeders who have tried to dispense with oil, or breed with less than the average amount, have met with a serious loss of wool and a deterioration of strength, fineness and evenness of fleece. After some of the heaviest rams' and ewes' fleeces, raised in Vermont, and those made heavy from the amount of oil in them, had been cleansed, it was thought that some dry, bulky fleeces could be selected that would produce more cleansed wool, but in no instance could a dry fleece be found that would produce the per cent. of wool of the oily ones. The bulky fleece is bulky because it is dry, and not for the reason that it contains more pure wool. An oily

fleece will always tie up tighter than a dry one, just as a wet fleece would not be half as bulky as when dry. You wet your fur and it will press together and occupy but little space, but when dry will lie open and light. A deficiency of oil causes the staple to be dry, harsh and weak, and the tendency will be to gradually become thin and coarse. I will say that years ago there was a class of merinos that had a great excess of oil and were invariably feebler in constitution, and for this reason were discarded from the flock. Breeders who have attempted to breed smooth sheep, with wool free from oil, have not only failed in heft of fleece, but have also failed in quality and quantity of cleansed wool. Wool owes much of its softness and brilliancy to the presence of a sufficiency of oil.

### Wrinkles.

Breeders consider folds, or wrinkles, in the skin an indication of heavy fleeces, and have therefore encouraged their development over the carcass. It is with wrinkles as with oil, some breeders carry these points to an excess. It is also true that heavy fleeces cannot be produced without them. At first thought it may appear to some persons that the merinos have an excess of oil and wrinkles for the wants of the practical wool growers. It will be remembered that the flocks of sheep in wool-growing sections are almost destitute of these two qualities of the merino, and as we breed for the improvement of all fine-wooled sheep it is best that these two qualities should be furnished in a marked degree. There has been a great change in breeding wrinkles for the past few years. The folds are not quite as large, but thicker, with less gare or coarse wool on them; in fact, the coarse hair on the wrinkles and thighs, on our best bred merinos, have nearly disappeared. Measurements of wool from different parts of the fleece of a ram showed the wool on the wrinkles on the neck as fine as the wool on the belly, and a little finer than that on the thigh. The wool on the wrinkles appears much coarser than it is from the fact that it is almost entirely destitute of oil. In this we often get very much deceived as to the quality of wool. This is true only with the best bred. Randall said, in his "Practical Shepherd," "that he never yet had seen a wrinkly sheep which presented the maximum of both length and density of wool, or yielded a maximum in weight of wool. For reasons which I cannot explain, the wool, though often very thick between the folds, is

never very long; and it is usually comparatively loose, dryish and light, as well as coarse on the outer edges of the folds." What Randall wrote of wrinkley sheep twenty years ago is not true of them to-day. The best merinos are wrinkley, they have good length of staple, a heavy fleece of fine quality of wool. "The average length of staple, of the Vermont fleeces, at the Paris Exposition, was $3\frac{1}{4}$ inches; there were nine that measured 4 inches and over, and two that measured full $4\frac{1}{2}$ inches—the measurements being for the full length of the fiber with the crimp drawn out." These fleeces were selected for heft of fleece as well as quality, and length of staple, and were taken from some of the wrinkliest and heaviest shearing rams and ewes in Vermont. The fashion of wrinkles now is to have from three to five heavy folds on the neck, not large on the upper side, but large on the under side; two or three short folds on and immediately back of each elbow or arm, fine, thick wrinkles running down the side, but not extending over the back. Wrinkles across the hip, sometimes from the tail in the direction of the stifle and sometimes at right-angles with these; folds also around the tail to give it a wide appearance, and also folds across the thigh, with a deep flank. These folds, except on the neck, if not too large, do not show when a year's growth of wool is on the sheep. These folds are what please the eye of the breeders of taste. I will here assert what I believe to be true, that any breeder, who attempts to breed from a ram without wrinkles or a certain amount of oil, will fail to realize any improvement in the wool-producing capacity of his flock. In 1844 and 1845 Mr. Charles S. Fleischmann visited Germany and made minute investigations of principles upon which wool raising and sheep breeding were conducted in Silesia, in their efforts to improve the Spanish merino sheep in its capacity as a producer of fine wool. The result of these observations and investigations was given in the Patent Office Report for 1847, from which I take this extract: "Twenty years ago bucks with a smooth, tight skin, which had extremely fine wool, were considered the best. The German merino wool growers had to come back to the original form of rams with a loose skin, many folds and heavy fleeces, and since then have succeeded in uniting with a great quantity of wool a high degree of fineness."

The Pedigree Committee, in their report, printed in the first volume of Register of Vermont Sheep Breeders' Association, say: "If

we admit that our best flocks of merinos have oil and wrinkles in excess of the wants of the practical wool-grower, for his wool-bearing sheep, as a class, we contend that we are not breeding altogether with a view of wool-growing in Vermont, but our most profitable product is blood that will produce improvements in the wool-bearing capacities of flocks in localities where it is hard to keep them up to the most profitable standard. Hence it is for our best interest—as it is for theirs—that we should be able to furnish them with sheep having these qualities in a very marked degree, and greatly in excess of what may, perhaps, be their ideal."

### Thickness of Fleece.

Here is where the greatest improvement has been made, and where the great increased weight of fleece is largely to be accounted for. I have not been able to get facts of the actual thickness of the average merino fleece of forty years ago, therefore cannot make any comparison with its present thickness. The oldest breeders are agreed that the improvement in this direction has been great. Mr. Chapman had a nice fleeced ram that proved not to be a stock getter; not wishing to impose upon or cheat any one he had the barren ram killed. One inch of the pelt, just as it was on the sheep, was taken out and sent to Dr. Cutting for him to ascertain the number of fibers it contained. It was found to contain 230,000 fibers. This pelt was, at least, one square yard, and, if so, would contain 300,000,000 fibers. If these fibers were two and a half inches long and placed end to end they would extend about 12,000 miles. Do you say that 230,000 fibers to one square inch is impossible? It may seem so at first thought, but think a moment. This is finer than 1,000 to the inch, but if but 1,000 to the inch, and the fibers were close together there would be 1,000,000 on the inch. The fibers occupy now but one-fifth of the space. You can press the wool, as it grows on the sheep, into one-fifth the space it occupied. The open space to the occupied, on a pelt of medium thickness of wool, would be about the same as the open space in thick wood land compared to that upon which the trees stand. We see from this that, notwithstanding the merino fleece is now thick, there is room for improvement in this direction. Close, thick fleeces are necessary in our cold climate to protect the sheep from the effects of cold and wet.

## Fineness of Fleece.

Until recently it was thought that, while it was an established fact that there had been improvement in the constitution, size, beauty of form and weight of fleece of merinos, the quality had become coarser. Recent measurements, made by Dr. Cutting, who is acknowledged authority in scientific investigations, has proved that, in fineness and evenness of wool, the improvement is nearly equal to that made in any other direction. In 1856 very accurate measurements of the size of fibers of merinos and Saxon wool were made under the direction of Mr. William Youatt, with these results: Merino wool was 1.750 of an inch; Suberelecta Saxon wool (which is the finest in the fleece) was 1.840 of an inch. The results of Dr. Cutting's measurement are these. Ten fibers in each fleece were measured.

| No. | Rams. | Age of Sheep. | Weight of fleece, lbs. | oz. | Live weight. | Size of staple, fraction of an inch. |
|---|---|---|---|---|---|---|
| 1 | Banker | 3 | 31 | – | 108 | 1-1198 |
| 2 | Patrick Henry | 5 | 37 | – | 147 | 1-1080 |
| 3 | Stub | 4 | 35 | – | 121 | 1-962 |
| 4 | General | 3 | 33 | – | 128 | 1 938 |
| 5 | Stock Ram | 2 | – | – | – | 1-938 |
| 6 | Stock Ram | 5 | – | – | – | 1-921 |
| 7 | Stock Ram | 7 | 21 | 8 | 91 | 1 1058 |
| 8 | Bismark | 5 | 32 | 8 | 132 | 1-891 |
| 9 | Stock Ram | 2 | – | – | – | 1 1058 |
| 10 | Ram teg | 1 | – | – | – | 1-1411 |
| | Average Rams | – | – | – | – | 1-1045 |
| | Highest or finest | – | – | – | – | 1-1411 |
| | Lowest or coarsest | – | – | – | – | 1-891 |
| | Ewes. | | | | | |
| 11 | Breeding Ewes | 6 | 19 | 3 | – | 1-1695 |
| 12 | " " | 12 | 9 | 11 | – | 1-1881 |
| 13 | " " | 10 | – | – | 80 | 1-1695 |
| 14 | " " | 4 | – | – | – | 1-1209 |
| 15 | " " | 6 | 13 | 12 | – | 1-1245 |
| 16 | " " | 10 | 10 | – | – | 1-958 |
| 17 | " " | 13 | 12 | 12 | – | 1-1005 |
| 18 | " " | 4 | 12 | 8 | – | 1-1204 |
| 19 | " " | 12 | 12 | – | – | 1-1058 |
| 20 | " " | 2 | 19 | – | 86 | 1-1204 |
| 21 | " " | 3 | 12 | – | 64 | 1-1058 |
| 22 | Ewe teg | 1 | – | – | – | 1-1268 |
| 23 | " | 1 | – | – | – | 1-1751 |
| 24 | " | 1 | – | – | – | 1-1080 |
| | Average Merino Ewes | – | – | – | – | 1-1308 |
| | Finest | – | – | – | – | 1-1881 |
| | Coarsest | – | – | – | – | 1-958 |
| | Average of both Rams and Ewes, | | – | – | – | 1-1190 |
| 25 | Samples of very fine Australian wool, | | | | – | 1-1451 |
| 27 | Samples of Silesian cleansed wool, | | | | – | 1-1005 |
| 28 | Samples of Cape of Good Hope wool, | | | | – | 1-2416 |
| 29 | Samples of Cotswold Ram's wool, | | | | – | 1-451 |

Last year Mr. Chapman requested Mr. Carl Heyne, of Red Hook, New York, (owner of the late Wm. Chamberlain's celebrated flock of Silesian merino sheep) to furnish him with samples of wool taken from the finest fleeced ram and ewe he had on exhibition at the New York State Fair. These samples, with those selected from a Vermont merino ram and ewe, were sent to Washington for measurement, which resulted as follows:—

Silesian merino ram, 1–1400 of an inch.
Silesian merino ewe, 1–1338 of an inch.
Vermont merino ram, 1–1315 of an inch.
Vermont merino ewe, 1–1372 of an inch.
Average of Silesian sample, 1–1369 of an inch.
Average of merino sample, 1–1343 of an inch.

The want of crimp in wool, when viewed with the naked eye, is not a safe guide to judge of the fineness of the fiber. Wool with but ten to fifteen crimps to the inch generally will look and appear coarser than wool with twenty to twenty-five crimps to the inch, when both are of equal fineness.

### Evenness of Fiber.

From the recent investigation into the quality of merino wool, as now produced, it is ascertained to have great strength and evenness of fiber. Ten measurements were made on each fiber which showed great evenness from root to the outer end. Years ago from one-fourth to one-third of an inch, on the outer end of the wool, was very much coarser than the rest of the fleece—in some cases three or four times as large. This coarse ended wool has been bred out and the merino wool now is even, and this evenness extends to the outer ends of the fiber. Evenness of fleece is one proof of good breeding. The following will show the evenness of fleece from all parts of the pelt, including the wool on the wrinkles. These measurements from different parts of fleeces were made by Dr. H. A. Cutting, of Lunenburg, Vt.:

| No. 10 of Last Year. | Size in fraction of an inch. |
|---|---|
| Shoulder | 1–1541 |
| Hip | 1–1411 |
| Wrinkles on body | 1–1038 |
| Belly | 1–1038 |
| Thigh | 1–921 |
| Wrinkles on neck | 1–1038 |
| Average size of staple | 1–1100 |

| | No. 24 of Last Year. Size in fraction of an inch. |
|---|---|
| Shoulder | 1–1339 |
| Hip | 1–1339 |
| Belly | 1–1204 |
| Thigh | 1–1038 |
| Average size of staple | 1–1204 |

## Length of Staple.

There are only one or two sections in our country where long, fine wool is desirable. In California, where the sheep owners are obliged to shear twice a year, it seems desirable to have long wool. You can't get a compact fleece with great length. A long, open fleece is not as good a protection against cold and wet as a thick, compact one. The breeder and manufacturer measure the length of wool differently. The breeder, when speaking of the length of staple, means the length as it stands on the sheep. The manufacturer means the length when the crimp is drawn out, which generally increases it from one-fourth to one-half. The average increase in length of staple, during the past forty years of improvement, is not less than thirty-three per cent.

The different flocks and families are gradually becoming more uniform. Most breeders differ but little as to the most desirable type and points of excellence. All are breeding heavy fleeces, less gare or coarse hair on the wrinkles, a more uniform fleece of finer quality, a vigorous constitution, with strong and marked characteristics. The great improvements that have been made have been mostly due to close attention to selecting rams and mating them with ewes with the view of remedying defects where they exist, and by care, and by feeding properly.

## Conditions of Success.

What are the conditions of success in breeding fine wool sheep? First we must select the best male and female—and more especially must we select the best male, which is the most difficult thing to do. We can completely remould and remodel our flocks by a judicious selection of rams. Whatever be our course of breeding, whether we cross, engage in by-breeding, or breed in-and-in, we need not look for success without a proper selection of rams. This is what

some breeders have too much neglected in the past. The ram is more than half of the flock. Take a flock of one hundred sheep —ninety-nine ewes and one ram—the one ram, in the sense of breeding, is a good deal more than half of the flock. Some breeders realize this, we judge, from the prices paid for stock rams. There have been sold and purchased in Vermont, the past year, several stock rams at $1,000 each, and much larger sums refused for others. These purchases have been made by breeders of wisdom and foresight, and, I have no doubt, will prove profitable investments. We must not only look to the pedigree of the ram, seeing that it is all right on the dam's side and on the sire's side, but must be sure he has merits of himself and is a getter of good stock. The ram is the fountain head of improvement, or degeneracy, just as his real merits may be. You may have inferior blood in a well-formed and promising-appearing ram. Be sure that you do not introduce inferior blood in this way; and for this reason it is safer to select rams from flocks which have long been bred pure. By in-breeding or by-breeding you do not go out of the family. Both parents can trace their pedigree to the same original source. When pure blooded merinos are bred to pure blooded merinos there is no going out of the family. It is really or essentially in-breeding, though not perhaps to that degree meant when we speak of breeding in-and-in. The more incestuous the in-breeding the closer it is and the more likely to intensify and fix the type. Some of the most successful breeders have been of this kind. Some of the greatest improvements in breeds have been made by this course of breeding, but where one breeder will succeed by in-and-in breeding ninety and nine will fail. A generation and a breed hardly ever furnish more than one such breeder. The merino sheep have, in the past, had one such breeder. Hammond's name goes down in history as an improver of the breed. Whatever be our breeding, there must be a judicious selection and coupling of individuals, for, however true the type, there is an individual difference that must be so adjusted as to breed up and not breed down. If strong points do not come together, at least the weak points, on one side, must be off-set by a corresponding strong point on the other. No matter how thoroughly bred nor how valuable the breed, there must be a proper selection and coupling of individuals if improvement is to be secured or degeneracy is to be avoided.

### The Merino an American Breed.

Has there been an American breed of farm animals, either of cattle, horses, or sheep, established in this country except the merino breed of sheep? Look at the breeds of cattle in this country. We may have, and undoubtedly have, as good short-horns as England, but our best breeders, by yearly importations, are still infusing fresh blood into their herds. The same with all other breeds of cattle. With all our importation and breeding we have not, as yet, bred a dairy adapted to our needs, a breed that has been established, fixed in their characteristics, that can be called an American breed. If any one should claim this, the two thousand animals exported yearly from the Jersey Island,—a large proportion of them to this country—for the improvement of our butter cows, the yearly importations of Holsteins and Ayrshires for the improvement of our milk and cheese dairies, would be a denial of this claim. How long this will continue before we have established a truly American breed of butter cows, a breed of cheese cows and a breed of milk cows, time will only tell. The same is true with the different breeds of horses. Last season the feats of Iroquois and Foxhall enabled us to point with pride to our race horses, but the Englishman's retort was, "we furnished you with the blood to beat us with." The different breeds of draft horses,—the Clydesdale and Gray Normans—the different breeds of mutton sheep,—the Cotswold, Leicesters and Southdowns, are constantly being improved by an infusion of imported blood.

The merino sheep of Vermont have had no new blood brought in from out the State for forty years. There is no flock or breed, outside of Vermont, in this country or Europe that is equal to our own flocks, or from which improvements could be sought for. The Vermont merino is an established American breed—a better fine wool breed than Europe can furnish. The best Spanish sheep ever imported would be discounted at the present time by any good breeder. I think the breeders of merinos in Vermont have the right to claim what the breeders of any other kind or breed cannot justly claim—that they have established truly an American breed.

A breeder of any kind of farm stock to be successful must observe certain principles of breeding; but there are also certain principles of feeding that are just as necessary for him to follow. A very important factor, in the problem of improvement, is the surroundings. The conditions must be kept, at least as good as those

under which your breeding animals were begotten and reared, even if your ground is to be barely maintained, and the offspring as good as the parent. Improvement of condition is one of Nature's methods of improving quality. Improved conditions are a great aid to the development of superior qualities. Sure I am that all breeding will be up or down as conditions are favorable or unfavorable. It has been said that necessity makes the man; that placing him in a position to draw out and develop his powers is the making of the man. We may say about the same is true with a breed: it is locality and condition that makes the breed; or state it in this way,—you cannot, even if in the hands of the best breeder, have a breed of a high degree of excellence if kept in an unfavorable locality and under unfavorable conditions.

### Food as a Factor in the Improvement of Our Merino Sheep.

One of the fundamental principles of breeding is that like produces like. This is a rule that has little variation when all the circumstances, conditions, care and food are the same. A wild animal, while remaining in his native home, will go on reproducing the same type with little or no variation, generation after generation. If its home is in a mountainous country with a cold, dry climate, you remove it to a level country with a warm, humid atmosphere, and a rapid change takes place, a variation in the type of the animal. It is climate and food that produces the many widely distinguished varieties of animals native of different countries and locations. It is very doubtful if the same breeders that took the merino sheep fifty years ago, and all their successors, with the same skill in breeding, could have produced as good a sheep in any section of our country outside of New England. The size, build, form of the sheep, the amount and quality of fleece would have been entirely different. It is variation that causes deterioration as well as improvement. It is in our ability to apply, to foster and to perpetuate such variations, wherein lies our power of improving our breeds of sheep. One of the most important causes of variation is feeding. Scant, poor food, causes the best improved animals to degenerate. Change of food changes the character of a breed. Animals are fed, as well as bred, in a certain direction to accomplish certain results. The English race-horse is commenced with at an early age and fed on dry, rich grain, of a kind that will early develop vigor, bone and muscle. Cattle raised in a country abounding in

rich pastures and rich food, fed with one thing in view—to produce a large and early maturing meat animal—rendered possible the short-horn. Different kinds of food will produce different results. One kind of food will grow bone, muscle, frame, another kind will fatten without much growth of body.

Prof. Stewart of Cornell Agricultural College, N. Y., fed a calf on food to build up his frame, and in a few weeks had a large frame, large bones and muscles, with but little meat, and no fat. After he had built the frame, he changed the feed to meat and fat-producing materials, and in a few weeks the frame was well rounded up—covered with flesh and fat.

The successful breeder and feeder will have certain objects in view, certain points that he desires to reach, and his whole course of feeding as well as breeding should be directed towards those objective points. The merino sheep of to-day are creatures of art, far removed from the production of nature by years of skill in breeding, feeding and care. To know the sheep of to-day we must study their history, learn how they came to be what they are. Without a correct understanding of this, how can we mark out a course for a successful future. They have their peculiarities and characteristics—the result of the climate in which they live. The peculiarly rich, sweet pastures over which they roam, the clear spring water which they drink, the geological condition of the soil on which they grew—all have aided the breeder to improve the merino sheep. The climate, the soil, the grass, the fodder, the feeding and care have all tended to make the sheep what they are. The breeder should not take too much credit to himself and claim that all this has been accomplished by carefully pursuing certain principles of breeding. If any breeder believes this, let him take his flock to Colorado, Texas or Brazil, and by his skill in breeding keep his sheep up to their present standard. Improvement in feeding, goes hand in hand with improvement in breeding. No breed of animals can reach a high degree of excellence without an abundance of suitable food, fed in right proportions. What is necessary for the breeder is to give his sheep just such quantity, quality, variety and relative proportion of food as shall give the most perfect development in all its parts and the most perfect growth of fleece.

The two objects of agriculture are the production of plants and animals. They are both composed of the same materials, in nearly the same proportion. We can grow plants without animals; but

not animals without plants. The sheep-breeder should understand the material available as food, and also the adaptation of the materials to the purposes for which he raises and feeds his animals. He should understand the processes of digestion, circulation, respiration and the production of flesh, fat and wool. When we speak of fodder, or feeding stuff, we mean those plants that contain all the nutrients necessary to build up the animal organism.

The nutrients, proteine and carbhydrates, should be fed in proper proportion to be capable of sustaining our animals economically, and produce the best results. Good grass, or good hay, contains all the groups of nutrients in proper proportion to sustain life and give a healthy growth to our sheep. Oil meal, either cotton or linseed, contains a large per cent. of proteine, roots a large per cent. of starch; either, even if capable of sustaining life, do it at a great waste of one or the other class of materials. They are a one-sided feed. Here is where breeders often fail to receive the expected results from feeding certain kinds of fodder. They feed a one-sided food. The important thing for us to do is to mix the food we raise or purchase so as to secure the best result at the least cost. Food rations need to be adapted to particular cases. The growing animal needs a different ration from the mature one, and these varied according to what the animal is to produce. The feeding standard for our merino sheep should be different from that of any other breed of sheep or any other animal. They produce the largest per cent. of wool to weight of carcass of any sheep, hence the ratio between proteine and carbhydrates should be less than for any other sheep. For the production of wool we must look to the proteine; but just at this point there is great danger. In feeding for the production of wool we must not lose sight of other necessary, absolutely necessary, qualities in our merino sheep; that is, build, size, and vigor of constitution.

There are two things which I think most breeders will agree are desirable: to increase the size and increase the wool producing capacity of our flocks without sacrificing any of the good qualities already attained. It should be the study of the breeder to understand just how much and what kind of the nutritive ingredients of feeding stuffs our sheep need for maintenance, and to produce the objects desired. German experimenters have studied into this matter very carefully in two ways, first by feeding animals with different kinds and amounts of food and noting the effect; second

by observing the results of feeding different kinds of food as practiced by the most successful farmers. The German feeding standards, although not exactly reliable for us, may be used as a guide by which to arrange standards of our own. The value of feeding standards, based on the results of experiments and observation, must depend very much on varying conditions. For the maintenance of full grown animals when at rest, if the quality of our fodder is known, it is possible to give a tolerably exact feeding standard, but it is another thing when feeding for production. Here enters an important factor in determining the amount and character of the food,—the amount and kind of production—whether that production be in labor from the horse or ox, or milk from the cow, or wool from the sheep. Different breeds, and even different animals of the same breed, show different capacities for production, and require different amounts of food. A feeding standard for a mutton sheep may not be at all suitable for the merino sheep. The sheep breeder should, by a knowledge of the laws of animal nutrition combined with practical judgement and observation, be enabled to so arrange feeding standards that, on the whole, will produce the best results at the least expense of fodder. The stock farmer very well knows that what we call coarse fodders, forage or hay, vary considerably in composition according to the circumstance under which they grow, the condition of the soil, their state of maturity, the condition in which harvested. It is, therefore, of the highest importance to learn how these various factors effect the value of a fodder.

It is a well established fact that the natural quality of the soil and its fertility has a very marked influence on the chemical composition of the fodder grown upon it. I think farmers often fail to realize the actual difference there is in the value of grass and hay grown on different soils, and the different effects the feed grown on different soils has on animal production. To illustrate the different effects of soil and feed, look at the Champlain Valley in Vermont, where I reside. This valley, lying between the Green Mountains and Lake Champlain is about twelve miles wide and some seventy miles long. The altitude is from 300 to 500 feet above the ocean. The general appearance of the surface is rolling and very much alike throughout the valley.

Notwithstanding the surface is nearly the same the soil is not alike and the different soils produce different results. It is a fact

long known by experts in beef cattle and butter that, while Addison county produced the best steers, the best beef, Franklin county produced the best butter. The white clover, clay pastures of Addison county will produce a higher colored butter, more oily, with poor keeping qualities, while the Franklin county butter has a better texture, better keeping quality, and is considered in market the best butter. These different conditions, which in this case is difference in soil, produced these different results, and had quite as striking an effect on the growth and general appearance of the fleece on the merino sheep. That quality in the soil and feed that produced the most oily butter will give a better oil, oil that will circulate through the fleece and produce a better surface and give a better general appearance to the sheep. It has been said that Vermont is the home of the merino, but certain sections in it are more favorable than others for their perfect growth. Addison county is the leading merino sheep county in the State, but with her twenty-three towns but six or eight are peculiarly adapted to their perfect development. It is sometimes the case that the locality that has all the conditions for the production of a superior breed, may all be taken in with the naked eye from the top of some central hill. The most favorable localities for the improvement of a breed are not common.

There is a great difference in the quality of grass and hay grown on different kinds of soil, and its feeding value for sheep is also dependent on the time it is cut and how cured. A large number of experiments have proved, beyond a doubt, that when crops are raised for fodder the greatest possible amount of digestible nutrients are furnished per acre when the crop is cut at first beginning of blossoming. Soon after blossoming the albumen in the stems and leaves is very rapidly transferred to the seed; if left to remain until the seed is ripe, it is simply hay straw. Clover is richer in the albuminoids; a mixture of clover with meadow hay usually improves the quality of the fodder. All kinds of grain contain the three groups of nutrients, proteine, carbhydrates and fat in large quantities, in small bulk, with little waste matter; hence are very important sheep food. Corn contains the smallest per cent. of the albuminoids and the largest per cent. of carbhydrates of any one of our grains; it is therefore not as valuable a food when growth of frame or wool is desired. There are several important things settled by a large number of experiments in Germany that

should be a guide for every breeder in preparing and feeding his sheep. It has been observed in numerous experiments with oxen, cows and sheep, that increasing the proteine of a ration has no tendency to diminish the digestibility of carbhydrates, but, on the contrary, when carbhydrates are added in large quantities to a ration it depresses the digestibility of the proteine to a considerable extent.

The greater the amount of sugar and starch that is added to a ration the more is the digestibility of proteine decreased, and when these are added to increase the nutritive ratio it not only lessens the digestibility of the proteine, but much less of the starch and sugar are digested, thus causing a double loss. A too wide nutritive ratio may cause more waste than a too narrow one. We learn from these experiments that corn is a poor wool-producing food, and that roots should not be fed to wool-producing sheep in connection with corn or poor fodder, but when fed should be in connection with good hay and grain rich in proteine.

### The Influence of Food on the Production of Wool.

Feeding has a decided influence upon the production of wool, but only within certain limits. The best and most abundant feeding is incapable of altering a short-wooled sheep to a long one, or a thin fleece to a thick one, or *vice versa*. This can be accomplished, if at all, only by continual breeding with these ends in view, aided by intelligent feeding. I think no one will deny that proper feeding for the production of wool for a series of years, will gradually affect and improve the amount of fleece. Let a flock of sheep be divided equally and bred the same for a term of years. The increase from the one half to be fed, not to fatten, but on a full ration of healthy, nutritious wool-growing food, the other half fed on food containing a large per cent. of carbhydrates, at the end of ten years, I believe there would be as great a difference in character and quality of fleece of the two flocks, as a wide difference in the breeding would have produced. "Full-grown sheep do not yield noticeably more wool under the influence of a fattening fodder, than of one which will keep them in good condition without causing any essential increase in their real weight." Several experiments made in Weende on Negrette sheep, on a maintenance ration, produced just the same amount of wool that a fattening ration produced. Another exper-

iment was made with lambs; a very rich fattening ration was fed lambs for nine months, with an increase of live weight from 55 lbs. up to 101 lbs. per head. Another lot was fed exclusively on good hay, and the increase weight in the same time was from 55 lbs. to 79 lbs. While the weight of unwashed fleeces was increased 24 per cent. on the first lot, the quantity of pure wool obtained in both cases was identical. The most wool seems to be produced when the animals are thoroughly well fed, but not fattened." If the daily ration be increased beyond what is necessary for this, no effect is produced on the growth of wool, but if the ration falls much below this the amount of wool will also fall to a certain extent. When a sheep is producing less wool than her structure fits her for producing there must be an increase of proper food to increase her wool product. When its food is unfitted, through its character or condition, to supply the requisite elements, then must a change of food for the better be beneficially perceived, on the yield of fleece. The better sheep will always respond to a greater extent than the poorer one.

Can the size of our merino sheep be increased and still retain the large per cent. of wool already attained? I think this may be somewhat doubtful, but no doubt the size of our sheep may be increased and the same amount of wool produced on the large as from the small sheep from the same feed. As a general rule the smallest sheep in our flock produce the largest per cent. of wool. The smallest sheep has the greatest surface in proportion to bulk or weight, and the small sheep, having the greatest proportionate surface of fleece, if it is of equal thickness and length must yield a larger per cent. of wool. Small animals of any breed require more food in proportion to their weight than large ones, because they expose relatively more surface to radiation, consequently lose heat more rapidly, just as two small balls will cool faster than one large one of equal weight. If we continue to breed and feed with this one thing in view, that is, to produce the largest per cent. of wool to live weight, there will be danger of our sheep going in the same direction of the smaller breeds of hogs and the Jersey cows. If we can produce the same amount of wool on the same amount of food, and at the same time do it with a good-sized, compact carcass, possessing great vigor of constitution, then our sheep will attain the object of their production. The advance in the improvement of our merino sheep, during the past few years, has been nearly as great by better and more judicious feeding as by

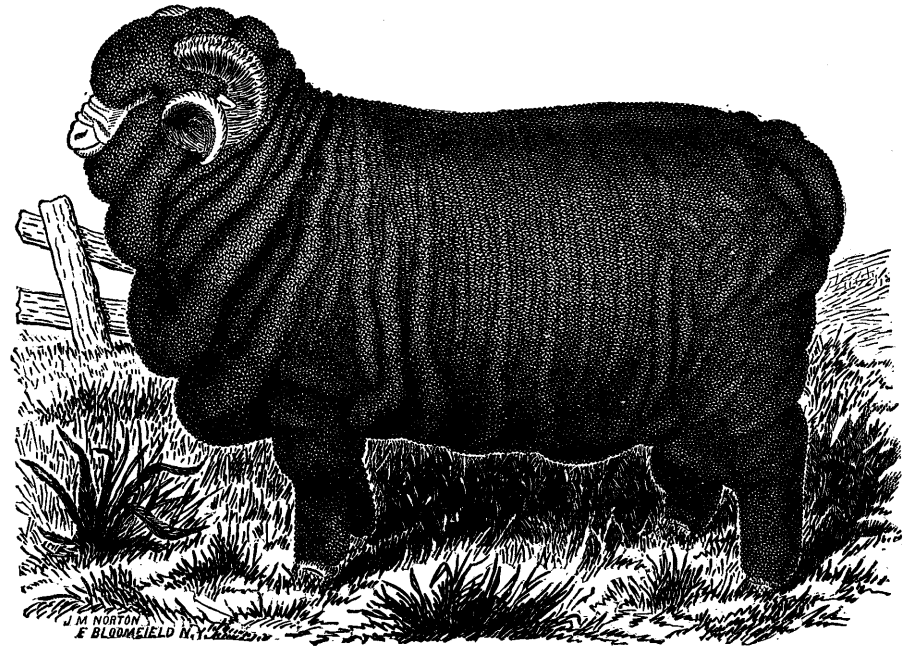
breeding, and it is in this direction that I look for improvement in the future. Investigation into the laws which form the basis of rational feeding of live stock has been most actively and industriously carried on for the past fifteen years by scores of scientific investigators in England and Germany, especially in Germany, and the results already achieved will be of great practical importance to the improvement of our merino sheep. The theory of feeding is being placed on a firm scientific foundation. The ultimate object of course is to enable us to feed better and more economically, but it may be a guide in the hands of our most successful breeders, to mark out their future progress in improving their sheep. The breeder who secures a knowledge of the natural laws of this branch of applied science, has a lasting foundation to build upon, and if he adapts his practice to the varying conditions which surround him and follows or appropriates intelligently the results of new investigations, he will be the successful improver of the merino sheep of the future.

The question as to which is the best sheep for all purposes, for your State, is an important one, and certain facts should govern in your selection of a breed. The climate of your State is variable—one requiring sheep of great hardiness of constitution, to enable them to endure the cold of your winters and the heat of your summers, with their frequent changes.

The merinos have found in Vermont a soil and climate peculiarly favorable to their growth and development, and it is a soil and climate not unlike that of your State. This breed is hardy, easily kept in large flocks on scanty pasturage in summer and on an economical supply of food in winter. They produce heavy fleeces, at a cost less than that produced on any other breed, and are fattened for market at as small a cost as any other sheep. They possess a strong constitution, carrying a fleece of great density, covering all parts where wool ought to grow, protecting every part of the body from climatic influences. They are the only good sheep which can be profitably kept in large flocks, and will fill more nearly all the requirements which the conditions of your State and people demand than any other breed. It is conceded by many persons who fatten mutton by winter stall-feeding, that the compact, solid carcass of the merino wether, or their grade, is the most profitable sheep to be fed for such a purpose. Combining the two products, wool and mutton, there is no breed as profitable.

The price of fine wool for the past eighty years has had a wide range, though not more so than other products. It has passed through disastrous revolution in the money market, and periods without tariff protection. Still, fine wool has been remunerative and its production has increased with the other products of the country, and to-day is in as prosperous a condition as most industries in our own country. Previous to 1807 wool brought a low price. During the next two years it rose to one dollar a pound, and during the war of 1812 it brought from two to two dollars and a half per pound. From 1815 until the tariff of 1824 wool sold at a low price. From 1824 to 1830 the price of medium quality merino wool averaged thirty-seven cents per pound. From 1830 to 1840 the extreme in prices was, lowest, thirty-five cents; highest, sixty cents; average price, fifty-two cents. From 1840 to 1850, the range in prices was from twenty-nine cents to forty-five cents; averaging thirty-seven cents. From 1850 to 1860 the extremes were thirty, and fifty-five; averaging forty-two and a half cents; 1860 to 1870, average was fifty-two cents; 1870 to 1880, forty-three cents, an average in fifty-six years of forty-four cents. This price is for what would be called now Ohio medium wool.

It is my firm belief that if sheep should become a prominent element in Maine farming, it would do for your State, to a certain extent, what it has done for England. "It has been the sheet-anchor of British husbandry." It is a necessity, is the main dependence, in the fertilization of the wheat crop. As sheep increased in England, her yield of wheat increased from fifteen to thirty bushels per acre. Sheep are the only animals which do not exhaust the land upon which they feed, but are constantly renewing its productiveness. While they are a good fertilizer of the soil, they require the least care of any farm stock, and generally give the largest returns in the shortest time. Two counties in my State that twenty years ago kept the largest number of sheep of any in the State, during a depression in the price of sheep and wool in 1868, changed to a large extent their sheep farming to cattle and dairying. A prominent farmer in one of those counties told me that in three years after the sheep left these farms, the pastures and hillsides were grown up to bushes, briars and weeds, that a large number of the hill farms were abandoned on that account, and that the means to restore them was to return to sheep farming. Sheep, independent of the return they give in wool and mutton, are useful among the




GOLIATH, OWNED BY DEAN & JENNINGS, West Cornwall, Vt.

weeds of neglected pastures, in the wastes overgrown with briars and vines, restoring them to good profitable pasture lands. The keeping of sheep for wool and meat production, is profitable and should need no other encouragement, but in addition to this, they are beginning to be acknowledged as a necessity as an ameliorator of the soil. Dairying reduces its fertility by withdrawing its needed phosphates and other needed elements, while the feeding of sheep tends directly to the enrichment of the soil. The keeping of sheep is a permanent and a necessary element in English farming. As our country grows older, the keeping of sheep and growing of grain will go hand in hand. Some good farmers think that one sheep to the acre enables them to grow more grain than they could grow without the sheep. Your State produced in 1880, 565,918 fleeces of wool—2,776,407 pounds; average, 4.9 pounds per fleece. Ohio keeps the largest number of sheep to her area of any State, but Ohio has but one sheep to every five acres. If Maine should keep one sheep to every five acres, you would have over five millions. According to the census of 1880, Maine produced on 43,829 acres of wheat, 665,714 bushels, or less than 13 bushels per acre. If Maine would keep five millions of sheep, I believe it would enable her to treble her area of corn, oats and wheat, and double the yield per acre.

Let us look for a moment at the encouragement the merino sheep breeder has for the sale of this class of sheep, and what the demand for the future is likely to be. According to the sheep and wool census of 1880 the clip of wool was thirty-five million fleeces. The number of pounds including pelts and pulled wool, was about two hundred and twenty-five millions. The amount of wool imported was one hundred and twenty-eight million pounds. This country, instead of importing wool should be a large exporter of this staple.

Large numbers of merino rams, during the past three or four years, have been shipped from Vermont, New York and Ohio to the South and West for the improvement of their flocks. From one station, that of Middlebury, Addison County, Vermont, there were shipped in 1879, forty-one; in 1880, sixty, and in 1881, seventy-one car loads, containing from one hundred to one hundred and fifty head in each car, of pure bred merinos, purchased for the improvement of sheep in other sections in the country, and the demand is to-day in excess of the production. If breeders of merino sheep in Maine had now one or five thousand good merino yearling or two

year old rams, I could find you a ready market for them at prices two or three times the price of grown wethers.

I will not detain you longer. I have an affection for the sheep paramount to that of any other domestic animal. My father was a breeder of sheep. I had the care of them when a boy, and since doing business for myself have kept and bred them. I can say from my experience that it is an important education, that it enables a man to judge correctly of his flock and know how to breed them and how to feed them. How can we judge of the best methods of breeding and feeding, unless we have carefully and accurately investigated the laws which control breeding and feeding. The most successful sheep breeders within my knowledge have made the breeding and care of sheep the study of a life time.

## AFTERNOON.

### SHEEP AS RENOVATORS OF THE FARM.

By T. B. HUNTER.

I am aware that the few words that I have to say to-day are not according to the teaching of writers and speakers on the subject of sheep husbandry at the present day. It has been said that truth is stranger than fiction. This may be true, but truth will bear investigation; the deeper you go the surer your foundation. It may be unpleasant and homely, not exactly in accordance with what we would like, but is the only sure foundation on which any enterprise can be prosperous. Fiction may be beautiful, it may point out to the farmer the sure and easy way to enrich his farm. It may make the future look bright. It may make the farmer to see in the near future, golden rewards, but it will prove a mirage. In an agricultural sense what may be truth for one farmer, to another may be fiction.

A man living in the vicinity of Portland may have made the raising of sugar beets a profitable business, he may write enthusiastic articles and give eloquent addresses on the profits of the business. To him this may be truth, but to a Franklin farmer it most truly would be fiction. A man owning a farm on low land may find that his soil is deficient in potash, and that by applying the same he greatly increases his crop. He at once adopts the idea that all a farmer need do is to apply potash, and his reward is sure. To him this is

truth, but to his neighbor one-half mile away on different soil it might be fiction.

A farmer who feeds his sheep large quantities of food not raised on his own land and looks well after the fertilizing material left by the sheep, may well set forth in glowing colors the sheep as a renovator of the soil.

John L. Hayes, secretary of the National Association of wool manufacturers of Boston, in an address which will be found in the Maine report for 1877, says that the conclusion arrived at by English writers is that sheep do not pay for themselves, but that keeping them is the only way they can carry on their farming operations and preserve the fertility of the land. The wool pays them something and the mutton pays something more. But the great object is keeping them to sustain the fertility of the soil. Say 1000 sheep are put on 1000 acres, they are fed every day with turnips on the land. The next year grasses of various sorts are grown on the land and on the third or fourth, wheat or barley, and the manure left by the thousand sheep carries the land through this four years rotation.

Here he is talking to American farmers of an English farmer. It is well for us to remember that we are not English farmers, and that it would be useless for us to expect that by feeding one sheep one year on an acre of land, that it would become sufficiently rich to carry it through a four years' rotation. The same writer also says: "I have heard of a case in Vermont where a sheep farmer was compelled to abandon one farm after another as they became too fertile for profitable sheep growing." Be this so or not, I have never known of a like instance in Franklin County.

The case is not applicable to us; but these writings and these sayings have led many of us to believe that sheep are great renovators of the soil. It may be so under English management, but it is not so under our management. In all these matters of farm management we should seek out the truth. Not what is truth to the English, the Illinois, or the Texas farmer, but what is truth for us on our own farms.

Every owner of a farm should consider carefully the future of his farm—whether he will by keeping this or that kind of stock, of this or that management be able to retain the fertility of his farm. A man surely grows poor if his farm is losing its fertility. Now, can we keep up that fertility by keeping sheep. Sheep possess no magic wand by which they can convert little into much. They can return

to the soil what they have taken from it, save enough to sustain the elements of life, and no more; this draws from the soil no small amount. Though if this was the only drain our farms might retain their fertility for a long time with but little perceptible difference in the amount produced. 100 sheep should yield 600 pounds of wool each year. This wool was taken from the soil. The yolk which is utilized in Europe is said to contain a large amount of potash, which is a much needed element for fertility. Then from a flock of 100 sheep we annually take from 2000 to 3000 pounds of mutton. Again we have drawn from the soil, and if we have not returned anything it has lost as surely as one from five leaves four.

But this is not our largest drain. The sheep is an uncontrolable animal. She loves her freedom—she loves to roam at pleasure. Here comes in a share of the trouble. We cannot or do not replace what she has taken. True, while sheep are feeding they leave their droppings quite evenly on the land. True, their powers of digestion are good, but what matters that if we cannot or do not take the advantage given us.

Our pastures and fields in many cases are broken; perhaps a high hill in the background; frequently some worthless shaded ravines running through the center; or an occasionally worthless spot covered with a few bushes.

Sheep almost invariably lie at night on the highest point of land. The higher and the more worthless the better. Here in this out of the way worthless place, among the rocks and ledges, they deposit in a condensed form, a part of the pasture over which they fed the day before. They start out early in the morning to graze. The sun comes up and they soon seek the shelter of the cool, shaded ravines which spring and fall are the bed of a brook, or they seek the cover of the woods, clumps of bushes, the fences, in all sorts of out of the way places, where they can find protection from the heat of the sun. Here again they while away quite a part of the day. Here again is forever lost to us, more of the life giving properties of the farm. Day after day, week after week, and year after year, this same routine goes on. The very life-blood is slowly oozing from the veins. The pulse beats feebly. But little is given to invigorate, but little can be returned. It soon becomes white with age. If our fields are pastured in the fall, pretty much the same thing goes on as with pastures. And we find our haymows are keeping time.

The buildings and the manner of life must keep pace with the farm. Soon an old cellar is the only monument that marks the abode of a once happy farmer. You may call this overdrawn. But what has caused so many farms to be forsaken if it is not the loss of fertility? And many of these same farms have largely been stocked with sheep. Two farms in my vicinity have recently been consolidated, and they both will carry no more stock than the one would forty years ago. These farms are good, strong, upland soil. The larger part of the stock has been sheep. The owner has a pasture which forty years ago would pasture 125 sheep. To-day 45 is all it will feed. I can multiply these instances by hundreds. I have been a keeper of sheep for more than twenty years. None knows better the heat of the battle, than he who carries the musket.

It is time we look this matter squarely in the face. If by keeping sheep we draw from our soil more than we can return, desolation will only be a question of time. We should use all possible effort to save the droppings of the sheep. This can be done to some extent by fencing portions of arable land and yard them at night upon it.

It is easier for me to point out the defects than to prescribe the remedy. Our farms should be at the present time in the prime of life. But it is a fact that many of our fields and pastures are covered with June grass. This means old age. Old age means that the journey of life is about compeleted. I can point you to sheep farms in Franklin which have received an annual tribute in the way of hay and feed from neighboring farms, yet these farms are white with age. Lo! where is the Spanish proverb, that "The hoof of the sheep is gold?"

### Discussion.

Virgil L. Craig, Secretary Franklin County Agricultural Society, said Mr. Hunter's points were well taken. The county of Franklin was deteriorating rapidly by reason of sheep raising. His experience in pasturing was that sheep weighed more when turned to pasture in May than when put in the barn in the fall. Neither do our sheep keep down bushes, thistles and weeds. On the contrary he knew of a sheep pasture which before being pastured to sheep was clear of, but now was full of raspberry bushes, brakes, &c. His plan would be to give up the white and barren hills to forest growth and give the sheep better pasturage.

Mr. Frank Butterfield, of East Wilton, a man of considerable experience with sheep, acknowledged that sheep in this county had exhausted the soil; but thought if properly managed, would not exhaust the soil, but rather add to it. Sheep dressing, composted with muck makes the best dressing for land that can be produced on his farm. It has greatly increased the fertility of his farm—trebled the hay crop in ten years. Is now breeding from coarse wools, with some grades and thoroughbreds. Wintered last year 100 sheep, one-half of them grades, and the other half thoroughbreds. Realized $700 from them; kept capital invested good, and improved on it some. He gets more wool from the thoroughbreds; but the bodies are not so large as grades. His flock averaged 11 pounds of wool per head; five bucks sheared 100 pounds; thoroughbreds averaged 13 pounds of wool. Composts manure and lets it lay a year, if possible; uses one-third sheep dressing to two-thirds muck. With its aid has raised good crops of wheat for the past five years.

Mr. Lane, of Vermont, said the average weight of his breeding ewes was 100 pounds, though some weighed 140. They breed at two and three years. Thought sheep should be fed some nights, while pasturing, and not depend wholly on the pasture—taking more away than they returned to the soil. Same applies to cattle.

Rufus Taylor, of Jay, thought the farmers of Franklin could learn to be practical and profit by keeping sheep. The reason for sheep exhausting the soil is because they take away more than they return. He favored muck and manure compost. Sheep dressing was thrown away when used alone; but with muck was a great benefit.

L. B. Bunnell, of Phillips, thought sheep were better renovators of land than were cattle.

Mr. Craig said his mowing fields were benefitted by letting his sheep run in them in the fall.

H. H. Smith, of North Farmington, said if he wanted to make money, he would raise sheep, but for renovating the farm would keep cattle and sheep, half and half.

L. F. Green had composted sheep manure, three loads to seven of muck; harrowed in with barley, and seeded to herds grass. Secured excellent crops of the latter without any June grass. Would put it on no more land than as though the sheep dressing were to be put on alone. Thought it a valuable dressing.

Mr. CRAIG said last year was a very poor year for potatoes, but he had never secured better yields, on mucky land, with sheep dressing alone. The chairman thought this was carrying out the combination theory of Mr. Green and others—muck and manure.

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## CUMBERLAND COUNTY.

### INSTITUTE AT CUMBERLAND CENTER.

The Farmers' Institute in Cumberland County, was held at Union Hall, Cumberland Center, on March 7th, day and evening. Free entertainment was provided for the members of the Board, the lecturers and others in attendance from a distance, by the citizens of the village. A thoroughly interested assemblage of practical farmers gave attentive audience to the exercises. W. W. Harris, the member of the county, presided, and promptly announced the subject for the forenoon's consideration.

### IMPROVING THE FERTILITY OF THE SOIL;

By Prof. WALTER BALENTINE, of the State College.

There are several different ways in which improvement of the soil may be brought about. One is supplying manures, which is the principal way. Then we have drainage in order to produce good crops, and tillage has much to do with making the soil productive. The most important of the three is the question of the manures, and we must enter somewhat into theoretical work in discussing it.

Investigations that have been carried out have shown that certain elements are taken up by plants from the soil and from the air, which are necessary to the life and growth of the plant. The office of manures is in one way or another to supply these elements.

In these investigations it has been shown that the most important of the plant foods taken up from the soil are nitrogen, phosphoric acid and potash. There are others that are equally necessary to growth; but they are always present in all soils in sufficient quantities to supply the demand for an indefinite number of crops. But

these three substances named are in such small quantities that in continuous cropping they become exhausted.

If any one of these elements of plant food be lacking from the soil the crop cannot be grown, no matter how much of the other substances are present. If you have a soil rich in phosphoric acid and potash, but lacking in nitrogen, you may put on as many superphosphates as you like—if none of them contains nitrogen you cannot make that soil productive. Whereas, being supplied with nitrogen it will produce a crop.

To illustrate the fact that a crop will not grow unless all the elements which are used in making up the plant are present, I have some charts here, taken from the original experiments carried out in plant nutrition. Buckwheat plants were grown in jars of water in which were put in solution the different elements necessary to plant growth. All the plants were managed in the same way save in the kinds of plant nutrition furnished.

In one jar was placed a solution containing all the essential elements of plant food, and a full-sized and perfect plant was the result.

In another jar nitrogen was left out, and a sickly, stunted plant was the result. Had there not been nitrogen in the kernel itself the plant would not have grown even as much as it did.

In another jar the solution was the same except leaving out the lime.

In another potash was left out, and in another chlorine.

These plants are all grown under exactly the same conditions, except that these elements are left out as stated. In one case we have the full grown plant and in all the others various degrees of stunted and imperfect growth. These three essential elements of plant food may be present in sufficient quantities but may not be in available form. They may be so locked up that the plants do not get at them. This is the condition much plant food is in. It may be brought into use by tillage and drainage, and also by fertilizers.

The next thing is to find out what the soil needs. You cannot tell this by merely looking at it. It may contain sufficient of everything but nitrogen for several crops. The point is to find out what element the soil lacks and supply that element. Some of these elements when supplied artificially are very expensive; the nitrogen that is supplied, on an average costs twenty-five cents a pound. It takes for a crop of corn of fifty or sixty bushels, seventy-two pounds

of nitrogen, and at the rate of twenty-five cents a pound, you would have to pay for this, eighteen dollars. If your soil does not need that nitrogen you are laying out for that crop eighteen dollars more than is necessary.

It is a fallacy that a chemical analysis will show just what the soil needs. Prof. Johnson of Yale College, at a meeting of the Connecticut Board of Agriculture, during the winter, spoke on this very point, and illustrated how a chemical analysis could furnish no indication whatever of the condition of the soil; that an application of Peruvian guano an inch thick over the soil would scarcely be detected by the finest chemical analysis. At the same time the application of one hundred pounds of guano has been known to double the crop. Yet this rate would be only about forty parts, in taking the analysis of the soil, in thirty-three millions, and the chemist, by all the ordinary methods of analysis, can detect and weigh but one part in one thousand.

The past four or five years many field experiments have been made for the purpose of testing soils. Some of these have resulted in facts of great value. With the three fertilizers named there are seven possible conditions in which the soil may be in which infertility may result from the lacking of one or more of these plant foods.

Take an experimental field of half an acre, thirty-two rods long by five wide, and lay it off into ten separate strips running lengthwise of the piece, and then apply fertilizers, leaving one plot without manure altogether. To the next apply a fertilizer containing potash, and nothing else; to the next furnish phosphoric acid; to the next nitrogen. Then put a combination of potash and phosphoric acid, and to the sixth a combination of potash and nitrogen. On the seventh phosphoric acid and nitrogen. On the eighth put on all three. On the ninth strip, barnyard manure; on the tenth nothing.

Plant these to the same crop and cultivate them all alike through the season. Measure the product and find out exactly what these plant foods have done. If you get as much from the potash as from all three together, it will be of no use to put on the phosphoric acid and the nitrogen, for the potash is doing the work of all. You can get potash for two cents per pound, and it takes two hundred pounds to the acre. By an additional application of phosphoric acid you can make an additional expense of six dollars. Suppose you add to these for the crop of corn the eighteen dollar's worth of nitrogen, you have then expended twenty-eight dollars for your manure.

Now sometimes, one-seventh of this will produce the crop. It depends upon the condition of the soil. In our worn-out soils it often happens that only one of the plant foods is exhausted. It sometimes happens there may be two. If you supply potash alone when it needs phosphoric acid as well, you get no crop, because they must be both present to produce the crop.

Prof. Sanborn of the New Hampshire Agricultural College, made the experiment on heavy clay and on high gravelly soil or loam, and found on the clay the needed material was postash, while on the high land there was plenty of potash, but phosphoric acid was wanting. Every farmer to understand the needs of his soil must make the experiments himself.

It was thought at one time that plants took up some nitrogen from the air. It has been proved by further investigaton that there is no large quantity of nitrogen derived from this source.

QUESTION: Would you advise using bone black for a fertilizer?

Dissolved bone black will furnish you with phosphoric acid, and that is the only fertilizing ingredient it contains, and would furnish it nearly as cheaply as any form, and in a condition that so long as it was not kept in the soil would never go back. Bone black is dissolved with sulphuric acid. Ammonia is constantly being manufactured on a small scale by the decomposition of vegetable matter.

I would now call attention to the waste going on even in best managed farms, in barnyard manures. These manures furnish the necessary substances in the cheapest form you can get them.

In barnyard manures you have all the food that is digested which does not go to the formation of flesh and milk. All the digested nitrogen passes into the urine. That is one of the most expensive of plant foods, and in this form it is in the best condition to be taken up by the plants. A little less than half of the manurial value of the manure passes into the urine, the rest into the dung; but the condition that the plant food is in in the urine is so much better than in the dung that you can say that at least one-half of the money value of the manure is in the urine. So far as I have observed in going around the State about nine farms out of ten allow the entire quantity of urine to go to waste, and thus lose half the money value of their manure. In many cases the manure is piled up outside the barn under the eaves where it loses from a third to a half of what remains. If you run your manure into the brook, in that way you cannot get along very rapidly fertilizing the farm.

I have compiled a table of the value of the manure from different kinds of material but we will only take now the value of the manure from a ton of English hay which is five dollars and eighty-six cents. For our purpose we will call it six dollars. If you allow a third of this manure to run to waste you really lose two dollars of the six dollars. If you throw the rest out of doors with no protection from the weather you lose two-thirds. Before putting out a great amount of money for fertilizers, I would advise our farmers to put more energy into saving their manure.

The best way to take care of manure is a hard question to answer. If you put the manure under cover and allow it to heat too rapidly, you lose much of your ammonia. For American farmers who have a good chance to build tight barn cellars, cemented on the bottom, that would be the cheapest way to protect the manure. As it is thrown out cow manure would not heat rapidly enough to hurt it; but horse manure often becomes no better than straw, all the nitrogen being burnt up. If these two be mixed together it will better both of them, for the tendency of horse manure to heat is too great, and cow manure you will find in barn cellars in a year as green as when you put it in. The horse manure will assist the decomposition of the cow manure, while the latter will cool off the former.

In many places in Europe it is a common method for the best farmers to have a shed built especially for the manures. The shed is boarded up some six or eight feet on each side with a roof over the top, and then in connection with this shed there is a cistern. The bottom rests on a concrete pavement and the juices are conducted into it. When the juices pour out of the heap it will begin to heat slowly. As soon as the heat becomes too violent the liquid is pumped back again and cools it down. So they carry on the rotting process so as not allow much to escape. That is a system where cheap labor helps them along. The manure has to be wheeled from the cow sheds to the compost heaps. When the manure heap smells strong of ammonia it is time to reduce the heat.

The principle value of muck is for use as an absorbent. In many cases it is cheaper to bed your cattle with an absorbent than with anything else. In some places straw is worth eight to ten dollars a ton and is altogether too valuable to throw under your cattle as an absorbent when you can get muck at much less cost. Sawdust is a good absorbent, but has no value as a manure. Oak

sawdust contains much acid, but that would be neutralized by the ammonia in the decomposition. Strong acids in the soil are injurious to most crops, so are strong alkalies.

There is no advantage from allowing swine to run over the dressing except the additions of their own manure. They will pack the manure so it will not heat, and rapid decomposition is not desirable; but if your manure is not decomposed before it goes into the ground, it may be several years before you get the benefit of it.

With manure in the barn cellar, saturated with urine, the best benefit can be derived from it by direct application to the soil and letting it rot there. Whether you would get the benefit the first year would depend on what crop is grown. The idea that you are going to lose anything from evaporation or drying up of your manures is not a correct one. The loss of nitrogen is the only loss you can sustain under these conditions, and only a small portion ordinarily would escape into the air.

MEMBER FROM OXFORD: As for the manure question, I am persuaded that Mr. Balentine is correct in his estimate of the loss occasioned by waste and careless handling. A great number in Oxford County throw their manure out of the barn windows and often allow it to run into the brook. I keep about ten cows and have been in the habit of bedding them with sand, which I have to haul some two or three miles. Sand has a tendency to cut the manure up and put it in better condition for the plants. Sand, I find very good for heavy, wet land.

SEC. GILBERT: From the standpoint of a practical farmer I wish to emphasize all that Prof. Balentine has said on improving the fertility of the soil. I presume it would be difficult to convince many farmers that there is five dollars and eighty-six cents worth of fertilizers passed by an animal from eating one ton of English hay; but it is a scientific fact, if rated at the valuation of commercial fertilizers, and should be accepted as such.

The methods of saving manure is a very important question. It must be saved if the fertility of the soil is to be kept up—the question is how to save it at the least cost.

QUESTION: Is not loam a good absorbent?

Dry loam, dry muck, sawdust or any other dry material is a good absorbent. It is a question which is the cheaper for you to obtain and use. In what way you will save your manure is simply a matter

of dollars and cents. I question whether sand is a good absorbent. Sand is simply pulverized rock and holds what adheres to it merely, while dry muck will take liquid and hold it like a sponge. Nevertheless, Mr. Hammond's remark upon the tendency of sand to cut the manure is suggestive.

Much depends on an even distribution of the manure through the soil. Sand helps to this end inasmuch, as Mr. Hammond says, it "cuts," divides or pulverizes it, thus rendering it possible to distribute it evenly. Further, sand is a coarse material and allows the air to penetrate through its substance, thereby aiding in the decomposition of the manure with which it is mixed. This decomposition renders the fertilizing material soluble in water and therefore valuable to the plants, and you get the benefit of it at once.

## AFTERNOON.

### COMPARATIVE PROFITS OF FEEDING AND SELLING HAY.

As introductory to a discussion of this subject, Secretary Gilbert said that the impression generally prevails that the selling of hay from the farm returns to the producer a greater income than if fed out to stock. It is thought best to examine the subject and see if this impression, which is being passed around from one farmer to another, holds good when examined by the light of modern methods and modern results. If this opinion was once based on a foundation of fact it does not necessarily hold good through all time. Before looking into this matter, and while still holding the prevailing impression of the comparative profits of the two practices, in my observations among the farmers, a surprising revelation was made to me in the evidences found, that in those localities where the raising and selling of hay have been made the leading feature of the farming, there is not to be found those evidences of prosperity and of wealth either on the farm, or in its surroundings and its equipments, that are everywhere plainly apparent where stock husbandry in some of its branches has been the leading feature, and requiring the consumption of the hay upon the farm. There is abundant evidence of this to any one who chooses to look up the matter. This being the case, there is a cause for it. Laying aside our

preconceived opinions, let us see in discussion if we can discover this cause.

If it be a fact that the keeping of stock is returning greater net profits than the selling of hay, the farmers of our State want to know it.

## MILK FARMING;

By C. H. COBB.

I want to give this meeting my experience in keeping cows for selling milk. That this business is a paying one is evident from the fact that so many follow it. Within convenient reach of a market, up and down the railroads and in the vicinity of the cities, it is made the leading business of the principal farms. Did not these farmers find it profitable they would not continue in the business. But we need not rely upon these indications alone. There are enough milkmen who have kept debt and credit so that we have not to trust to guess work in the matter.

I have been in the business for seventeen years, with the exception of one year. The first thing is to secure a herd of good cows, for the cost of keeping a poor cow is nearly as much as for good ones. Good cows that are well fed the year round, will give on an average, about 2,700 quarts of milk in a year. The price of this milk varies somewhat according to locality. I have made an estimate for the past ten years so as to get the average price. This I find to be about 3½ cents a quart the year round at the door or at the station. This will make an average yearly income per cow of $94.50.

The amount of feed required is not a matter of guess work either, but has been ascertained by taking the scales to the barn and weighing accurately all the food consumed. A cow will need, of good hay, 20 lbs. a day, and with the ration of other feed fed by milkmen, will need no more. In addition to this she should have 3 lbs. of cotton seed meal for ten months, omitting it during the flush of pasturage in June and July; three lbs. wheat bran for six months, during winter and spring; and 2½ lbs. corn meal for the same time. The hay is worth an average of $12 a ton at the barn; cotton seed meal, $30; wheat bran, $16; corn meal, $30. These prices are higher than the cost for several years past, but I do not wish to mislead by under-estimates. In addition to the above is the pasturage which in my own town can be hired for $6 a head for the season. The account for keeping will stand thus:

| | |
|---|---|
| 2 tons hay | $24 00 |
| 900 lbs. cotton seed meal | 13 50 |
| 540 " wheat bran | 4 32 |
| 450 " corn meal | 6 75 |
| Pasturage | 6 00 |
| Total | $54 57 |

The cost of milking and attendance cannot be so definitely fixed since none of our milkmen keep so large a herd as to require the entire time of the help employed. Only estimates can be given. A liberal allowance for this may be set down at $10 a cow for the year. Total cost of keep and attendance, $64.57, leaving a profit of $29.93, with all the feed figured at market value. Or, after allowing for attendance and deducting cost of meal rations, there is received for every ton of hay fed out the very satisfactory sum of $26.96—certainly a better showing than can be made by selling the raw product.

In practice, usually, coarser and less valuable material in the form of corn fodder and hay of a low grade quality is substituted for a portion of the hay, which reduces cost somewhat, and increases profits proportionally.

It is not supposed that every one on first taking up milk farming can at once reach the very satisfactory figures here made. Only with good cows is it possible, and these must be fed, cared for, and handled with extreme care and good judgment. All men are not so constituted that they can do it, and their results will in a greater or less measure fall short of the highest success. There is, however, sufficient margin for variations in the profits here given to allow a considerable measure of failure, and still the business bring market value for crops fed out. Besides, it should at all times be held in mind that the hay and other home grown products do not cost in raising, their full market value, so that, if under adverse conditions, one does not succeed in reaching quite the market value, there is still a saving clause to fall back upon—the cost in place of the value.

Some farmers object to feeding meal during the summer and fall months; but in my experience there is no time when it is more needed and when it will pay better. About the first of August the pasturage begins to fail, and unless you do feed, the cows not only give a less flow of milk but slowly fall into a lower state of milk

production and lower condition of flesh, and it costs more, and is more difficult to bring them up again to the proper standard than it does to keep them up by early feeding. They do not require feeding from the barn so early in the fall on a fodder ration when this is done. In all respects it is better to commence feeding meal as soon as the pastures fail to furnish an abundance of feed.

There is a manure value coming from these feeds fed out which is of great importance, and may properly be placed to the credit of the cow. But taking into the account the milk income only, and the receipts from a milk farm where all the hay is fed out, show a large margin over what would be realized from selling the hay. A farm cutting 30 tons of hay will keep 15 cows; these cows will bring a gross income of $1,421.50, or a profit over all expenses of keep and care, of $448.95. The hay sold at the barn at the average price of $12 a ton would bring in gross, $360. Make all needed deductions for casualties and losses and still there is a good showing.

S. L. Holbrook, member from Sagadahoc County: I have been in the way of selling more or less of my hay. Last November, I bought a couple of cows for the purpose of trying an experiment. I did not buy the best or the poorest cows. I gave $25 apiece for them. I began to weigh their hay and take account of what they consumed. I did not sell their milk but sold the butter to Bath marketmen at 25 cents at the door. For ninety days they made 158 lbs. of butter, amounting to $39.50. Milk, 1080 quarts, at one cent a quart, and the manure I have given credit for at $10. Took pains to bed the cattle and used absorbents. I have charged $21.60 for cotton seed meal, corn meal and shorts fed out. The object was to find out how much I got for my hay. I had been selling it at $15, and wanted to get more if I could. I fed 3780 lbs. of hay. The account stands thus:

| | | |
|---|---|---|
| 158 lbs. butter at 25 cents | $39 50 | |
| 1080 quarts skimmed milk at 1 cent | 10 80 | |
| Manure (estimated) | 10 00 | |
| | | $60 30 |
| Paid for meal and bran | | 21 60 |
| Leaving | | $38 70 |

received for the 3780 lbs. of hay fed out, or a trifle more than $20 a ton.

At the end of the ninety days I sold the cows for $10 each more than I paid for them—not from a rise in value, but from an improved

condition. This was not an extreme case. If hay will pay $20.47 per ton to feed an average cow, of course it will pay a good deal more to feed to a good cow.

This is as far as my experience goes in the matter, and I am quite satisfied with it.

Mr. HARRIS: I believe that a man knowing how to do it can make as much in stock raising as in dairying. There is always a demand for good blooded stock at paying prices. I have just sold a two years old heifer for $75, and I could sell more if I had them. This is not an extreme price, but it gives better returns for keep than could be realized from selling the same on the market.

I know there is money in keeping cows, for I have figured on it from my experience and have arrived at substantially the same conclusion as Mr. COBB. I find that a can (eight quarts strong) of my milk will make a pound of butter, and I have sold my butter for thirty cents the year round, and have the skimmed milk left. There is a market for gilt edged butter, and the man who has it can get almost his own price for it.

Mr. NICHOLAS RIDEOUT, of New Gloucester: In this dairying business where they can put the milk on the cars it is all right. But in the butter matter you have not reckoned in the depreciation of your wife. The farmer may make money but his wife is overworked. The great trouble in butter making is to get help to do it. My feeding of cows is substantially the same as Mr. Cobb's.

The quality of stock is a most important matter. If you are going to manufacture products you want to make a good article, and you cannot get that unless you have good tools to work with, in other words, the right kind of stock.

Mr. HAMMOND, member from Oxford: Mr. ELLIS, of Paris gave us an account of his dairying operations the other day, for ten months. He makes butter and sends it to the Boston market. He uses a Cooley Creamery and a number of months out of that time he made skim milk cheese. During the time he milked fourteen cows. They earned him $1100, besides paying for all the provender he bought for them. He took these figures from the checks sent him back from Boston. He only bought 112 bushels of meal for the ten months. He used five acres of oats.

For the last ten years I have sent my milk to the cheese factory in South Paris. A strict account has been kept of everything my

cows made till the last three years. My cows averaged to earn me from $50 to $75 a year, and I do not calculate I had extra cows.

Prof. BALENTINE: Mr. COBB's practice brings him an annual profit per cow of $30, omitting cents, above feed and attendance. Other speakers corroborate these figures from their own practice by approximating closely to them. But there is another income from stock fed which has not yet been entered in this account. In considering the disposition of products the manure question must never be overlooked. Computed at the cost of valuable ingredients in commercial fertilizers, the feed consumed by a cow in a year will return fertilizing material in the manure, worth as follows:

| | |
|---|---|
| 2 tons hay | $11 72 |
| 900 lbs. cotton seed meal | 7 28 |
| 540 lbs. bran | 3 07 |
| 450 lbs. corn meal | 1 25 |
| Pasturage (equivalent to 2½ tons hay) | 14 65 |
| Total for the year | $37 97 |

The fertilizing material from the pasturage is principally returned to the pasture and may be omitted in this connection. From the hay and purchased feed fed out, the manure is worth $23.32, providing the voidings are all saved. Just what part of this may be saved and utilized as a farm manure will depend on the attention given to the saving. It is certainly practicable to save the principal part of it. Where the hay is sold nothing is saved to be returned, and the seller must go into the market and purchase commercial manures at the prices used in these calculations or the fertility of the farm will be reduced. So the cow may justly be credited with the value of the resulting manures in addition to the profit from her milk or butter. It is plainly seen that intelligent handling will thus secure larger profits from feeding than from selling the hay.

Mr. NELSON, of New Gloucester: I am largely engaged in fruit growing, but in connection with it carry on general farming. I have always made it a rule to feed out my hay except when a surplus accumulates on hand. In this way I have built up the production of my farm, from a small quantity to a yield of seventy-five to eighty tons a year.

Mr. JOSEPH SAWYER: I began the first of the winter with seven cows, and have kept an accurate account of all the feed given and

butter made. I find I have been getting something over twenty dollars a ton for the hay fed, besides the value of the manure.

Sec. GILBERT: As connected with the subject under consideration, it can be easily shown that it is not best to devote a farm chiefly to the production of hay unless the soil is in that condition which renders it unfit for other crops. It is better to introduce diversified cropping for in that way we can get more profit out of the soil than with a single crop. Rotation of crops is simply an intelligent system of coaxing out of the soil a greater production with a given expense of fertilizing applications than can be done with any one single crop continued year after year. So that hay as a special crop has its objections, and especially as a crop for sale it is still more objectionable. It has been plainly shown that our stock raisers, our milk men, our butter makers and cheese makers are realizing more than the market value for all the hay fed, saving the resulting manure for their farms, and at the same time availing themselves, without cost, of fertilizing material from rich foods purchased for their stock.

We have no disciple of sheep-husbandry here to present the claims of that kind of stock, but there is no one who questions but with the good management necessary to success with other kinds of stock, that sheep will return to the feeder the full value of all food eaten.

These facts which have been disclosed in the course of this discussion here are important. With the greater profits of feeding the hay and the increased fertility of the soil on which it grew is the fact that the system gives employment to more labor, increases the population of the farming towns, gives increased business activity in the community, and still is all done at a profit. Is it not then quite time that these trains of cars carrying off our hay were run off the track, and the farmers do better by feeding it?

## EVENING.

A full house assembled in the evening to listen to a lecture by Prof. G. T. FLETCHER, of Augusta, on country schools, after which a vote of thanks was given for courtesies and attentions on the part of the citizens, when the Institute adjourned.

# ASSOCIATED DAIRYING.

BY FRANCIS BARNES.

[Embracing the lectures delivered at South Paris and Union.]

In the earlier years of the past decade a factory method of making cheese was introduced into our State. The first factory was put up in the town of Strong, in 1871. A few others followed in 1872; and in the next three years, with a kind of a rush, these structures were put up and furnished, until we find sixty-three cheese factory organizations entered upon the records of the Maine Dairymen's Association. Our New York visitors, at that time, spoke of the mighty strides of Associated Dairying; but unfortunately that striding over the land suddenly ceased, and to-day the number of working factories is very much below the prospect of seven years ago. If we include the six new factories set in operation since that date, out of the total of sixty-nine in all, only thirty were used the past season. Again, out of these thirty, but three of them made 60,000 pounds of cheese each, that is, did business enough to warrant a fair income to the milk owners and operators. Some of them are dragging along at a point just above the starvation limit, while others do a limited business in the midst of good dairy sections of the State. Their opportunities for expansion are most seriously curtailed through private dairying all about them. Such a record of the cheese factory movement challenges attention, and no intelligent discussion of Associated Dairying can be entered upon until the causes of the failure of this initial method of work are explained, and the appropriate lessons drawn therefrom. The method of 1871 and its stereotyped reproduction during the next four years, was not a method of Associated Dairying, in its proper sense, at all.

The beginnings were not from the right sources, and disaster was inevitable. How the movement started in one town was explained by an honorable member of the Governor's Council, at a meeting of the Board of Agriculture, in 1873. He said, "We thought a cheese factory would be a good thing for our town, and some of us built a factory for the farmers, and were satisfied to charge them eight per

cent. for the use of our money." The moving interest too often was not that of the milk owners, but of speculators, or those engaged in trade. Such men were looking to their own interests in the matter of the profit; and their active agency aroused distrust on the part of the average farmer, who felt himself in the position of the fly towards the spider. It seemed to such a man as though it were said, "We are going to handle your property, and make eight per cent. on the score of accommodating you." With the instinct of self defense, he says, "I will keep my property in my own hands."

The only course then open to the speculating interest was either to abandon the undertaking, or by laborious effort buy the milk as far as possible, by paying all there was in it, and that of course was only a little longer road to the point of abandonment.

Another mistake on the part of this external interest in the cheese making was, that many factories were erected where there were but few cows, and no particular opportunities for extensive dairying. Milk, and that too in bountiful supply, is actually a necessity for a factory, but apparently it was not deemed so eight years ago. Kindred to this idea, but not quite so fatal in its results, was the expectation that here in Maine, the business could be carried on profitably with a less number of cows than was held to be indispensable elsewhere. An essayist at one of our conventions said that it had been proved that factories of one hundred fifty cows or less, could be run at a profit in this State. The wrecked corporations in different counties, who have sold out their property, or are still trying to sell it at the merest nominal prices, are evidences of these serious misconceptions of the true nature and scope of the Associated Dairying enterprise. The few stock company operations which have survived to reach the possibilities of a large business would now do well, and greatly enhance their prosperity, to slough off that old speculating interest, as an outgrown and useless encumbrance. A few factories in the valley of the Androscoggin have survived to do a comparatively small business from year to year, and yet, as allusion has already been made, they are prevented from obtaining liberal support by the continuance of the practice of the making of farm dairy cheese all round about them. They seem like trees half girdled about the trunk — living indeed, but not full of life. Their condition is so anomalous that only a close inspection of their methods of work and their products would reveal the causes

of the existing situation. General principles altogether fail to elucidate the problem.

From this brief sketch of the course of the cheese factory undertakings within our borders, we must draw at least two conclusions; one, that the ideas taken up and worked upon in these organizations were erroneous; and in the second place, we need to seek after that natural and harmonious method of the work which shall ensure success.

A very clear thinker has stated that when we find ourselves enveloped in a mental fog, the best possible way of extrication is to attend to our definitions. Put the ideas we are trying to use in the clearest cut form of expression of which our language is capable, and see what we have. A way of making cheese has been tried, and in a superficial mode of treating upon it, it has been styled Associated Dairying. If "we attend to our definitions" what do we find as the the true meaning of that phrase? Dairying, as defined by Webster, is, "That department of farming which is concerned in the production of milk, and its conversion into butter and cheese." It is simply and strictly a part of the farm operations. Persons not actually employed as milk producers are not competent, under the definition, to have a part in the conversion of the milk into butter and cheese. When we come to attach the word "Associated" to it we also find limits to the scope of that term. By the same authority, we find associated from the verb associate, which means, "To join in company as a friend, companion, partner or confederate." In all successful associations there is a common bond of sympathy, or mutual standing ground, on which all meet, and unite their energies. This is true in religious, political and social bodies. Effective results are achieved by oneness of the main idea, and unity of action in its execution. As the fog now scatters, we find that Associated Dairying simply means, the joint action of milk producers to secure the making of their butter and cheese, in the most economical way consistent with high grade results.

The home of this idea is Oneida County, New York, where at Rome in 1852, Mr. Jesse Williams conceived that he could make up the milk of his sons and neighbors' cows as well as his own, and all at the same time. This was the germ of the present vast butter and cheese-making interest of the United States and Canada. And, too, it was complete in itself, at the start. In so far as operations have deviated from Mr. Williams' plan, and that still pursued in the

Mohawk Valley, just so far has dissatisfaction or deterioration ensued. Let it be repeated: Mr. Williams made the cheese. His sons and neighbors furnished what milk there was besides that from his own herd. The speculator to wring his percentage out of the farmer's milk, or the trader who would have the butter or cheese-making one part of the store business, is an interloper. Analyze the records of any of our defunct and dying organizations under the light of these truths of the definition, and the difficulty is revealed, like the ragged rock on which the good ship struck in the mist and darkness.

The question now properly comes, "What is the natural and harmonious method of work that shall ensure success?" It is simply this and nothing more: The farmers of a given locality need help in their dairying. They hire a cheese-maker, but instead of each farmer hiring an individual maker the associating farmers bring the milk to one suitable place, where their help carries on the necessary work. This is a mutual association without discordant elements. The farmer's interest is a unit, and their help, or the cheese-maker, finds his standing ground to be the same as theirs. The farmer and the cheese-maker are the two contracting parties, and the bond of the association is such that whatever serves the purpose of the one does in a like manner and to a like degree, that of the other.

The farmer seeks for the largest returns from the capital invested in the cows. This can only be secured to him through skillful manipulation, which costs the proper sum. The maker seeks the best income attainable. That can be realized through the handling of large amounts of milk. What stimulates the milk producer to increase his flow of milk is directly to the gain of the maker; and that stimulus is primarily derived from the money returns which the maker's skill secures. The better the reputation of the factory, the the more income to the parties.

This true and easiest method of Associated Dairying is, thus far, nowhere in our State fully carried into practice. The departures from the proper methods were so great in the start that the process of evolving the correct and economical out of so much misapplied labor and capital is slow and laborious. Three factories recently started are essaying the task, but have not yet fully succeeded. The Nickerson factory at Houlton is owned by the cheese-maker, but the

practice of selling the milk prevails to a very large extent. Factories were built at Patten and Maple Grove last season, which are private property of the owners, who are not cheese-makers. The proprietor at Patten died in course of the season, and the prospect is doubtful.

A word or two further upon the difficulties of the attempt to associate such discordant elements as a stock company, or a trade interest, with the farmer's butter and cheese-making may not be amiss. The first point is that, at its best, it causes too much and needless division of the returns from the work. There is literally no room for a third party. The farmer's returns for his work and capital invested are small in the average, and he cannot afford to pay for a speculation in the making up of the milk. The cheese-maker works hardly half the year, and cannot afford to pay a royalty to any parties out of his wages.

In the second place, experience has most clearly shown that the third interest is so antagonistic to the true idea of Association that it arrogates for itself the first place in the arrangement, and inevitably the first portion of the earnings.

In case the milk is sold, it must be bought at so low a figure as to ensure the purchaser his profit, or, if the milk owner is too obdurate, the making must be made sufficiently low to leave the profit of the work in the hands of the speculator. This way of doing now passes current under the name of the Ohio system, and a low grade of cheese is the result.

If a stock company patronizes the farmers, the price of making must be put quite high, which causes trouble, or the cheese-maker must be hired at a low figure, and poor cheese is the outcome.

There is something almost pathetic in the story of the experience of some of the factories in Franklin county, as narrated by one of the sufferers. The situation was complicated somewhat by the small amount of milk which could be had. "We found," said the narrator, "that if we had a good cheese-maker, the cost of making charged to us took all the profit; and if the cheese, on the other hand, was made by a cheap maker, it was not worth anything." That method of making could but succumb to adverse fate.

Factories organized upon the plan of those at Patten and Maple Grove have a future before them, if sufficient care is taken by the patrons to see to it, that a good reputation is earned and kept by

the factory. There is a constant pressure upon the owner, where he is not a cheese-maker himself, arising from a supposed interest, to save expense and cheapen the work all the way through.

That factory is a success which has secured for itself a reputation for a uniformly high grade class of goods, and commands the hearty support of the great majority of dairymen around it. In fact it has become an essential part of their farm management and household economy.

Despite all the failures which have occurred, and the difficulties to surmounted, there is money in cheese for the farmers in Maine. Let the indispensable details of the work be suitably understood, and fully grasped by those properly interested in the work, and the best success is sure to follow.

The advantages of cheese-making are manifold and can be readily enumerated. By the associated method of work it is possible to obtain a uniform quality of cheese. That quality can be of a high degree. The returns therefrom to the cow owners are largely remunerative, without any outlay of capital beyond that invested in their stock. As a natural consequence the stock on the farms is very much increased, and with heavy stocks of neat cattle, a locality is on the road to prosperity.

The great bane of the dairy markets now is the constantly varying nature of the articles offerd for sale. A walk through the retail stores of any of our large places will soon show how great the variety of cheese offered, and the comparatively low grade of the same. The difficulties in the way of the ordinary farmers, who keep but few cows, if they would wish to make strictly pure goods, are altogether insurmountable. In the city of Augusta, at one time the past winter, not a pound of strictly prime cheese could be found whether of factory or farm dairy make. The cause for this state of things is not that the men and women interested in such goods do not want to make prime cheese, but that, in the lack of appliances on the farm, with too much of guess work, in the use of rennet, in the points of temperature, and the curing of the curds, the cheese when offered on the market is too often destitute of all that is essential to make it acceptable. In this, as in butter-making, the farmer finds it impossible to obtain the necessary skill to make just what is altogether prime.

It can, indeed, be said just here that factories do not necessarily make a uniform article. This is admitted, but when that is the case,

it is solely the fault of the milk owners and the cheese-maker. That fault can be remedied with the factory, but not so with the individual. As a rule the power to remedy is beyond his reach. The associated method can control conditions, and that fact is the key note of success. Let the right method be put to work in the territory adjacent to the city of Augusta, and the result to the consumers in the place would be as surprising as it would be gratifying.

The quality of the associated cheese can, and always should be, of a very high degree of excellence. The best type of factories always make good cheese. All through the Mohawk Valley there are such which turn out year after year the choicest of cheese. Their whole season's make can be depended upon, and is paid for accordingly. The demand for this grade increases faster than any possibility of supply, and there is the most ample room for whatever might be further undertaken among us. The only absolute requirements which an association need make of the milk owners individually are the perfect purity and sweetness of the milk as they deliver it. These conditions can be met. All other points are in the control of the maker, and if he is held to the proper accountability, the result is a uniformly high grade of cheese.

From a recent agricultural paper the following item is clipped: "If the owner of a cow will realize the fact that, unless she pays him in clear cash, $44.50 yearly, she is kept at a loss, he will soon become interested in the subject of the improvement of cows;" and it may well be added, in the matter also of associated dairying. The high grade work does most certainly assure ample remuneration to all owners. When prices are high this quality is at the top, and when prices are low, it still readily moves at the higest attainable figures for such seasons. Thirty-five dollars for the milk of six cows for six days in the week, for a space of five months, is not more than a possible average figure for any factory, rightly managed, to pay each of its patrons. Add to this the value of the remaining milk products, and we soon pass over the limit fixed above, and find a surplus for investment.

The fact must not be lost sight of that these gains are made possible without any burdensome investment in milk-houses, apparatus or trouble of marketing. The individual maker of prime butter or cheese must, in addition to his milk, have all the fitting up for manufacture at his own expense. He must look out the channels to market, and bear all the expense of moving small amounts at a time. The

association of effort reduces the investment down to the stock of cattle and the cans, and all the other outlays, to the smallest amount consistent with safety.

The keeping of cows seems, in the nature of things, to be the most fitting work for the farm and the foundation of highest prosperity. The wild nomadic tribes of the earth keep horses and sheep, but they have no civilization or enlightment. They live in a barbarous, roving manner, continually warring and being warred upon, and their flocks and herds are such as can be driven readily to fastnesses and places of safety. The cow needs quietness, care and abundance of feed. She is an accompaniment of the highest types of life; and the latest and greatest triumphs of steam and electricity are hard at work in rendering her products available to toiling millions.

"It is impossible," said a speaker at one of the Farmers' Institutes, "to reckon up all the profits of a good cow." The butter, the cheese, the skimmed milk, the whey, the calf, the pigs, the pork, the piles of manure, and finally, hide and carcass are each and all constant sources of income. These facts about the cow are all well known, but many a farmer has been compelled to forego the advantages of their possession, because it was out of his reach to utilize the milk at its highest flow, and up to the capacity of his farm. Associating himself with his neighbors in cheese-making, the difficulties all vanish. He can then surround himself with the lowing herds to his heart's content.

This is the result of association. The towns where the factories are flourishing have to-day many more cows than prior to their advent. The number continues to increase year by year. With a heavy stock of cattle to consume all he raises, with his method of cropping wisely suited to his needs, our farmer is prosperous and accumulates a competency. It has often been remarked that, even under the old system of dairying, where here and there, a farmer was found with a large stock of milch cows, as his method of work, there invariably has been found thrift, contentment, and money to invest. This exception becomes the rule around the factory.

We are brought now in our argument to the conclusion that a wider extension of the dairying interest under favorable conditions is for the interest of our farmers. This branch of farm operations assuredly opens the way to the obtaining of much more than a livelihood. Our young men have drifted westward from year to

year in order to make money, as they say. If they would put themselves within the scope of Associated Dairying, and work with the same assiduity that one has to in the Western wilds, they could find equal money returns, and the continued enjoyment of New England social privileges. The loss entailed upon those who abandon such facilities for the culture of our higher faculties does not weigh a great deal with many, but in the careful summing up of the items which enter into the sum of a useful and happy life they count far more than bare money getting. If the money, the reward of honest toil, in excess of the bare livelihood, can be had from the farms of Maine, the attending comforts and opportunities of our Eastern homes are unsurpassed.

It was not declared unadvisedly by Mr. Goodale and other thoughtful writers, that Maine has unsurpassed natural facilities for a dairy State; and at this time, in the light of recent experience, it is now seen that in the matter of prime cheese-making climatic conditions dominate with absolute sway. Two facts illustrate this situation. Considerable amounts of cheese have been bought this past season in Central New York, for the retail trade of Western and Southern cities.

At the last meeting of the National Butter, Cheese and Eggs Association, held at Cedar Rapids, Iowa, it was freely conceded on all hands that Iowa, while making immense amounts of choice creamery butter could not produce strictly prime cheese.

Amid the impetuous rush of the North-Western States into dairying during these past ten years, it seemed as if they would monopolize the business of the whole world in that line, but now in the afterthought, which inevitably follows such movements, and the classifying of the makes of one section with another, it is found that climatic conditions are imperious and cannot be transgressed.

The breadth of territory in which first-class cheese can be made is limited, and is not susceptible of indefinite expansion. The West cannot compete with us, to our injury, in the line of cheese-making which is within our reach. It should be the ambition of every farmer connected with cheese-making to do all in his power to increase the amount of cheese made each season of that quality which is within the possibilities of our State. There are "millions in it" for the State at large, and a proportional share to whoever patiently and persistently works to that end.

In organizing for success under the methods of Associated Dairying herein indicated, or in remodelling existing operations with a view to better returns on the investment, the three-fold character of the business should be fully and clearly comprehended. The parties to the association, should be only two—the milk producer and the cheese-maker. They are competent for the work and their interests are identical. The one brings all the milk he can control to the other, who, with his suitable buildings and apparatus, takes the milk, and in due season yields up the ripened cheese. The two then have a common interest in the disposal of their product, and this selling of the cheese becomes the third characteristic of the work. It does not however involve the stepping in of any other interest to help the sale of their make, for the two are still competent within themselves.

The first step in the work is wholly confined to the farm. Here the milk is produced and prepared for the factory. The second stage of the work is the making of the cheese, which includes the curing of the cheese curds as much as the mere coagulation and heating of the milk. Lastly the combined wisdom and business tact of the whole interest is taxed with the problem of converting the season's make into its proper value in money. That the end may crown the work, and success be stamped in unmistakable lines upon the effort the parts assigned to each of these divisions of the work must be fully carried out, and a short-coming in either one will cripple the whole. It would be difficult to decide which of the three stages of the operation is the most important. The best of milk can be spoiled in the manipulation; the most eminent skill on the part of the maker will be barren of satisfactory results if that skill is put upon poor milk, while the pride of the milkman and the ambition of the maker will be covered with confusion if the sale is not conducted with eminent financial ability.

All clear thought upon this subject comprehends all the distinctive parts of this division of the work; and on the other hand disaster and loss have always resulted from failures to keep clearly in view the indispensable requisites of the same. While it is indeed difficult to single out one of the three branches, as the most important, yet the milk certainly lies at the foundation of the business; and its condition is so vital to success that perhaps one test, and an important one, of a competent maker would be his ability to discern differences in milk.

"The Prerequisites of Associated Dairying" is a convenient phrase employed to cover the ground involved in the amount and condition of the milk to be made up at any convenient centre of the community. A yield of milk from two hundred cows is as small an amount as should be deemed sufficient to begin a factory operation; and then there should be a certainty in the prospective increase upon that number within a short time. It is axiomatic in cheese-making that the larger the amount of milk in daily receipt the better for both of the parties. Ten thousand pounds per day, as the maximum figures, give a safe and profitable operation. In this amount there is enough income to satisfy the maker, and enough product to induce competition and close buying, to the benefit of the owners. Further, the expense of making does not increase in proportion to the amount of milk, but rather the reverse. If it cost two cents per pound to make four hundred weight of cheese per day it would cost but one and three-fourths cents to make up half a ton per day. One cheese-maker only is employed, and the additional help is ordinary unskilled labor. It will be seen how great a mistake is committed in putting factories too near each other. Better far to make half a ton per day at one place than five hundred weight each at two places, for the large amount is of a uniform quality. The two small lots may or may not be alike, most probably not. Buyers will deal more readily and with more satisfaction where they find large amounts together. A radius of six miles sweeping around the location of the factory is better under the conditions that exist here in Maine than any less distance. There must be good elbow room, and if two concerns are working within that number of miles of each other it were far preferable for them to consolidate interests than go on as at present.

The distance which farmers will go with their milk depends upon the reputation of the factory and the individual dispositions. One man will find it to pay him to haul his milk twice as far as another will decide would surely run him under. "Nothing succeeds like success," and the attraction of a large paying operation is catching. A regular rate of seven miles, season after season, is not an unheard of thing. The thought of carrying milk seven miles staggers many at the first, for "Will not the milk be injured by such long carriage over rough roads?" If the milk be in the right condition when it starts, two or three hours on the road will not change it. It will pay farmers to haul milk seven miles when they are reasonably

certain to get a first-class article of cheese, and are not so situated at home as to make a strictly gilt-edged butter.

As understood in factory parlance, all the cows give good milk. The contamination and loss begin from the time when the animals yield up their lacteal treasures to the hand of man. It costs much to keep the cows and pay the expense of making the cheese; but all chance for remuneration is cut off by a poor article.

Certain necessary steps must be taken to ensure the quality of the milk, and no possible legerdemain of one man or another will compensate for their omission. Unremitting diligence must be ever employed around and upon the milk to guard it from ill until it disappears through the factory window. What the milk is in the vat, such without material change will be the cheese of that day. If the milk is poor, the maker contends in vain; the aroma is irrecoverably gone. As in the case of the delicate downy tinting of the well ripened fruit, if once ruthlessly handled it is gone forever.

Proper skill in the factory will preserve all the good qualities of the milk as it has been delivered, and can make a cheese which shall for a year at least grow better and better. Keeping qualities depend entirely upon the milk. A kind of jockeying trick can be employed upon milk that is off-flavor, but such manœuvres no more renew the lost goodness than the coloring of a few hairs or the filing of the teeth make an old horse a colt again.

The difference in the qualities of cheese are too much overlooked. There is a wide range of possibilities, as in butter, and the milk-owners must admit that on themselves rests in a very large measure the responsibility of the product made from their milk. They must further be willing to allow in every case where the maker insists upon better milk and more care that he is not "too particular."

Good milk means milk of healthy cows, which is carefully drawn from them into bright tin pails, with all the surroundings as clean as possible. The tin pail alone is suitable inasmuch as one can never know when the wooden pail is absolutely sweet and clean. On this point there is now no chance for argument. It must be conceded by the milkman, or his milk should be rejected.

Cooling the milk is next in order and likewise of first importance. The animal heat unduly retained in the milk is as injurious as in the carcass of the slaughtered beef or pork. As well put the pork into the pickle the moment the butcher has done rinsing it down as to make cheese out of milk without the animal heat driven off. The

one safe, easy plan is to cool in water, and it takes but little time and trouble. Careless and indifferent people say that the cooling of the morning's milk is needless, because the milk is soon warmed again at the factory. As much is there no need of cooling the pork because it must be warmed again in the frying pan.

Whole milk or the entire mess of each cow with nothing subtracted or added, is a necessary part of the preliminary conditions. Just what the cows give, no more and no less. It is passing strange to what contemptible tricks many persons will resort to impose upon their neighbors and the factory.

With a close observance of these suggestions the milk can hardly fail to be right, but sometimes without intentional slighting the milk has begun to turn sour. The cheese-maker's cultivated senses perceive this change before it is possible for ordinary persons to tell the slightest difference. The acid as it developes becomes almost a devouring flame, for it consumes richness, delicacy and flavor alike. It is exactly like fire, a good servant but a bad master. It leaps beyond control if it obtains a start in the milk before the factory is reached. The graduated cream glass may well be called the cheese-maker's sheet anchor, for when other tests fail to satisfy, this simple glass will disclose many a secret the milk owner believes only his own. It is not necessary to claim that it will bring out every possible half per cent. of cream; but it will invariably show how little cream there is, and make an invaluable comparative record of one mess against another.

The members of each association should appeal readily and often to the test of the glass. Know just how they are getting along in comparative richness, how their neighbors' figures stand, and particularly and constantly the record of all milk that may be sold. It is the part of the milkmen to furnish plenty of good milk; see to it that it comes in abundant profuseness and arrange the methods of work at home so that the milk shall go to the factory for seasons of five to seven months in the year. When all this is done the first stage of the work has been successfully accomplished. Then may the association most justly call the maker to the strictest account as to his competency, fidelity and the quality of his make.

The second stage of the work now demands attention, and in the scheme here elaborated the cheese-maker owns the factory and apparatus. This is altogether the best arrangement, and the paramount reason is because it renders the operation stable and inspires

the greatest degree of confidence. Only the right class of maker would make such an investment, and on that capital he would work uninterruptedly as long as he was able. Such a man with his outfit occupies just the same relation to the farmer as the grist mill and its owner do. In either case they will be patronized just so long as they do satisfactory work for a fair price. It has been objected that such a system would require a different kind of cheese-maker from what we now have. That may be admitted but it does not affect the question at all. Cheese-makers who have property to invest can be found if the opening is deemed promising, or if a maker is already at work in any locality where he sustains a good reputation and his cheese is sought after, it would be quite easy to help him into the ownership of the property. Give him work enough and he can soon pay for the buildings and outfit. No better support is needed than the hearty coöperation of twelve to twenty solid farmers.

The next advantage is the elimination of the third party interest. This has been dwelt upon, but its importance justifies its coming up here again. The intrusion of this influence has wrecked many factories. Where it is still allowed to exist it is sapping the association of its life blood. Each person patronizing a factory so managed, is giving a portion of his property and income to that third interest, for which he receives no equivalent whatever. If the milk is sold there is an outright surrender of all chance to make anything. The milk is bought at a figure to make the buyer perfectly safe. If the milk is not sold, the farmer will still be deprived of his full income, in whatever instances he furnishes his supply to a cheese-maker and a third speculating party. He will lose either through excessive cost of making or through the making of poor cheese. There is no escape from the alternative.

In starting a new associated enterprise now, a much less investment in buildings and apparatus is called for than was supposed necessary heretofore. The days of three to six thousand dollar buildings is gone in the State of Maine, never to return. It is not a difficult matter to control the amount needed for suitable appliances. A special facility exists just at the present time in the opportunities to buy the outfits of dismantled and abandoned undertakings. One such was recently purchased for the sum of one hundred dollars. A one-story building commends itself to enlightened experience, for the expense is very much reduced, and for

curing purposes a room on the floor close to the ground is altogether the most desirable. The convenience of doing the work is also very much in favor of the one-story.

The work-room should be commodious, fairly lighted, and yet without excessive size to cause waste of time and labor in keeping clean too much floor space. The floor of this room should have a slope of about three inches to facilitate the speedy removal of all slop and washings. If the roof is extended on over the driveway, where the milk is delivered it will add very much to the comfort and convenience of the milk carriers. A trifling expense is incurred, but much indirectly gained. The curing-room can open from this work-room, in any direction found most convenient. This should be laid out spacious enough to accommodate the season's make. A method is now coming into favor which economizes floor space very much. It is to erect a line of posts the length of the room in each of the table spaces, and upon arms mortised through them place the shelves in tiers above one another, upon which the cheese can cure. This arrangement triples or quadruples the capacity of the room, at the option of the operator. Twelve hundred dollars might be set down as an outside figure for the construction and furnishing of such an establishment.

If the milk is the foundation of the business, so truly the maker is the architect and builder of the superstructure. After the milk men have done all within their power he can make or mar their fortune. With him rests the finality on all points of texture, flavor and keeping quality. The importance of the cheese-maker's position and the responsibility resting upon him are many times not sufficiently considered, either by the maker himself or the patrons.

Too many look upon cheese-making as a merely mechanical trade, to be taken up at option, by any person of fair abilities, and who, after a certain definite time spent in practice, will consequently, find himself fitted to take charge. This time varies, usually, from two weeks to three months, according to the self-esteem of the candidate, and the credulity of the factory owners. Great mistakes have been made just here, and are the cause, in the main, of so much poor cheese. A mechanical view of cheese-making comprehends merely the manipulations of the milk, through certain processes, and finally, at a fixed time in the day, puts away the curd in the press, just the same as casting of iron or any metal. This mechanical work is quite often met with.

Stepping into a factory about noon of a warm August day, the cheese-maker was found with the sleeves of his flannel shirt well rolled up, the sweat standing in beads all over his face, and with his mouth full of tobacco, hard at work, with his attendants, over the curd of his second vat; the curds lay in lumps about as big as a man's fist. He was glad to see company, and talked freely about his experience and ideas. "It isn't much of a trick to make cheese. I certainly ought to have good cheese, for I work hard enough, and long enough. I get in here just at sunrise, and stay here till dark, about every day." The outcome of this free and easy work was that lots of his cheese was carted off and buried out of sight and smell.

In another—the maker was a young man from New York. He was married the winter before, and the two had the factory in charge. The wife was the embodiment of neatness and skill in house-keeping, and the factory was scrupulously clean and tidy. She often said, "Our cheese must be nice, for my husband takes all the pains he can; he does just the best he knows." But for all that the cheese was dry and crumbling. If there is not something more than an external mechanical proficiency, the quality of the make is not desirable.

This conclusion brings us up to the proper definition of cheese-making. It is an art, not acquired by the committing of rules, or by deduction from a scientific method. It is a personal accomplishment, an individual acquisition, which others may, or may not, successfully imitate. To illustrate: the studios of the masters of painting and sculpture are ofttimes thronged with devotees and pupils, who would seek to catch the inspiration of these great artists; but who has ever seen a second re-production, through the personality of another, of the work of any eminent name, in either art?

The painter may impart instruction as to the blending of colors, the laws of perspective, and the preparation of the canvass; but what has the pupil got of the master's peculiar mental fibre, from which comes the very warp and woof of his work, and with which, in graphic touches, he outlines his subject, fills it in with delicate finish and grace, and thus stamps it as a creation of his own?

As proof of this position, the statement of a most skillful cheese-maker is to the point: that in ten years' experience, but one out of all the help employed as second hands had become a successful cheese-maker.

The remark is often dropped by persons who come into the factory: "Now we have come to steal your trade; it isn't very hard work to make cheese, is it?" The reply always is ready: "Oh no, any one can bring a cheese curd, and you are welcome to steal all the trade you can."

A Doctor of Divinity came in one day and, in the course of a very free and interesting conversation, asked about the tests of milk. He was answered that, in the main, they were taste and smell; but to his powers of perception, unused in that direction, he thought those senses would be poor guides. Some makers, even, do not seem to be able to test carefully by smell and taste. One in particular, undertook the charge, who could not tell when his vat was changing. There should be ability to smell the sour before it tastes, and taste the approach of the sour condition before actually discernible by ordinary skill. It is, perhaps, a fair question for makers to discuss, whether it is possible for one to run successfully, the season through, on a fine line of cheese, without that almost prescient delicacy of the two senses.

The right stamp of maker is he who is "born, not made," equally with the poet. The natural aptitude should be looked for, and when found should be estimated at its true worth. One of our factories thought of letting its maker go to another place, whereupon the buyers at once wrote up that if they made a change, the price on the cheese must go down from one cent to one and a half cents per pound. The consequence was the maker did not go. It will be urged, however, that we cannot readily know about the right qualities. It is not asking too much that, in any case, a maker shows his recommendations, and these should always be, not from those who have employed him, but from the parties who handled the cheese. A new factory interest can get suitable skill with a little pains-taking, and exercise of good judgment. It were better to postpone an operation a year than to begin with a doubtful hand.

To return again for a moment to the curing-room and its construction. The questions of temperature and suitable care are important in connection with this room. External influences should be altogether cut off from the cheese while curing. To secure this, the readiest method is to fill the walls with sawdust, and lay sheathing paper between the floors above and below. The exposure of the windows should be to the north and east, for the afternoon sun will raise the temperature if at all admitted. From 60° to 70° is

admitted as a suitable range in the summer, and from 70° to 80° in the spring and fall. The impression produced upon one who steps into such a room, on a hot July day, is such as is felt on going into a cellar. Under these circumstances the perfume of the ripening cheese strikes the senses most agreeably. As fancy suggests, one thinks of the pine apple, the strawberry, or the rose. These subtle exhalations which baffle analysis, are a sure guide to the maker. The character of cheese curds which throw off such delicacy of odor is fixed beyond all question. It is a process of fermentation that is going on and there is need of the same surrounding conditions as in the operation of yeast in the bread. The careful curing finishes the work begun with good milk and seconded with skillful manipulation over the vat and sink.

The cheese, however, is not necessarily sold when cured, and to the consideration of this third element in the work of the associated interest attention may now profitably be turned. Well would it be if the production of a strictly prime article of food would ensure its sale at the proper value. But, as is only too well known, a prime article is bought as nearly at the value of ordinary grades as the ignorance or inattention of the owner will admit of.

The adulterations and imitations of butter and cheese which are forced upon the markets, are going far to change radically the hitherto pursued methods of buying and selling. Individual reputation and the mark will yet have to be the guide of the purchaser. The frauds are so well made to appearance, that prime dairy goods will have to be sold like canned goods—a well known stamp the only safe-guard. The remedy against these frauds is not through legislation, but it can come through consumers. Let them buy only the well known brands, and rally heartily to the support of those establishments, where quality and excellence are rated higher than "smartness" in the owners.

As matters now stand, with the purpose of the buyers to buy as low as they possibly can, and make a depression of values in the best lines atone for too high prices paid for poorer grades, "in order to keep good friends and save their feelings," the only open road of safety to the association is to rally around one of the best business men and let him act as salesman. Unless this is done the old fable of the oxen and the wild beasts is re-enacted everytime.

Harmonious action in close sympathy with each other alone will secure all that is possible. Men too often do not like to admit that their neighbor can do better than themselves. The feeling is that each can do as well as the other. But such is not the teaching of human experience. It is the reversal of all that, to maintain that special financial abilities are not possessed by some to a greater degree than by others.

A substantial benefit of association is that the best skill in this line can be freely availed of. In how many instances has it become true that members of such bodies have got far more from the same cows than before joining themselves to them. The credit of that increase may fairly be shared between the cheese-makers and the salesman in more cases than one.

A trifling commission secures the services of the keenest business man among the farmers who are operating together, and this sum when distributed on the cheese is so almost inappreciable that it is the simplest folly to try any other expedient. Again, sales are made much more promptly and carefully by the one party ; and particularly on the question of how long to hold before selling, the salesman is far more competent to judge than twenty different men. He has watched the market closely, has sounded the probabilities of the situation, and by meeting different buyers has a fair gauge of the chances before him.

The sum of the postion is this ; in any and every associated effort get together the largest amount of absolutely good milk that is possible, have it made up by a competent person, for a fair price, and finally sell the cheese through the agency of a leading milk owner of recognized financial tact.

A few practical thoughts may be added in conclusion. Should a change be made in the methods of work of the factories among us which have survived the wreck of the general movement of eight years ago? Undoubtedly it would be for the benefit of all the farmers where these factories are located, if whatever of the purely speculative condition that still clings to them were done away with, and that kind of royalty upon their incomes taken off. Where the total of the season's make is not more than eight or ten tons, it cannot pay anybody. The building and fixtures are wearing out, and the capital invested is about sunk out of sight. The making of the cheese must be put at a low figure, too low to secure competent

skill. The little portion of cheese accruing to each farmer is too small to be worth the buyer's attention. Such a beggarly way of living does not inspire confidence, hardly respect. Just what is to be done in the way of change depends upon the particular situation, but the first step in all cases would be that the farmers most interested should decide that enlargement and elevation must come. If this determination is resolutely taken the question of milk supply would engage attention. With plenty of milk in daily receipt most remaining difficulties would be readily mastered.

In what additional sections of our State could the associated method of dairying find fair scope for itself? In general, wherever sufficient milk could conveniently centre around the factory. In the theory of the matter, Waldo county has good facilities for this kind of work; but the practical outcome of these years is, that attempts were quite generally made, and now many of them are abandoned. Kennebec county presents most favorable conditions, and the success of the one factory within its borders is an earnest of the possibilities for others. The seacoast counties do not seem to be the home of many cows, and so long as this is the case the energies of their farmers can better be employed in other branches. The great river valleys seem to be the special dairying sections. In the watershed of each of our streams, especially above the tide-water the keeping of cows could well be made a very prominent part of the farm. Somerset and Franklin counties have given themselves so thoroughly and successfully to sheep raising that for them it is simply to "let well enough alone." The valley of the St. John is the great field for associated dairying. The necessary conditions can all be met easily and profitably. Those fields that stretch into miles of contiguous smooth mowing and pasture lands were made for the abode of the peaceful and industrious cow.

# APPENDIX.

## FERTILIZER EXPERIMENTS.

The following circular, containing directions for carrying out the fertilizer experiments instituted by the Board, and a diagram of plots to be devoted to the experimental crops, was sent out to the members and other farmers who proposed to make the trial:

### DIRECTIONS.

Select a tract of soil for the experiments that is somewhat run down in productiveness, and needs plowing and manuring, and also that is uniform throughout. It should be as nearly level as possible. After having been plowed and thoroughly pulverized, lay out in plots of eight square rods each, or one twentieth of an acre, after the plan of the accompanying diagram. The plots should be long and narrow—a desirable proportion being one rod wide by eight in length, though this is not arbitrary. If the shape of the tract is such as to require it, the plots can be arranged in a double tier, meeting together endwise, instead of side by side as in the diagram. If the tract is inclined, lay out the plots up and down the slope, in order to avoid, as much as possible, the washing of the fertilizers from one plot to another. Set strong stakes at each corner of every plot, and preserve the number given to each carefully.

DIAGRAM OF PLOTS (one-twentieth acre each).

No. 1.
**Barn manure—one half cord.**

No. 2.
**Phosphoric acid—15 lbs. Dissolved Bone Black.**

No. 0.
**Without any fertilizer.**

No. 3.
**Potash—10 lbs. Muriate of Potash.**

No. 4.

Phosphoric Acid and Potash. { 15 lbs. Dissolved Bone Black.
10 lbs. Muriate of Potash.

No. 5.

Full ration of Nitrogen with Phosphoric Acid and Potash. { 15 lbs. Sulphate of Ammonia,
15 lbs. Dissolved Bone Black,
10 lbs. Muriate of Potash.

No. 6.

One-half ration of Nitrogen with Phosphoric Acid and Potash. { 7½ lbs. Sulphate of Ammonia,
15 lbs. Dissolved Bone Black,
10 lbs Muriate of Potash.

No. 00.

Without any Fertilizer.

No. 7.

Barn Manure—one-half cord.

The design of these experiments is first of all to interest the experimenter in accurate experimental work for the purpose of inducing closer observation of actual results in his farm operations; and further, to learn the special needs of the soil operated upon, that greater economy of fertilization may be introduced and the profits of crop production thereby be increased.

Plot No. 0 and the duplicate No. 00 show the present capacity of the soil without fertilization. Plots Nos. 1 and 7 manured with barn manure show the results of ordinary fertilization. No. 2 will show the effect of an application of phosphoric acid alone. No. 3 of potash alone. No 4 with the two combined. No. 5 will show the effect of the application of a complete manure containing the three fertilizing substances, nitrogen, phosphoric acid and potash in quantities sufficient to produce a good crop. No. 6 is designed to test the important question whether it is profitable or necessary in order to produce a crop of corn to apply the full amount of nitrogen used up by the crop. A comparison of No. 6 with No. 5 will indicate this.

Several members of the Board, and some interested farmers not connected with it, tried these experiments in full, and others tried a part only. The accuracy of the record of results in some cases was interfered with by accidents which impaired their value to the public, but such even afforded valuable lessons to the experimenters. The returns from some of these experiments are here given in a condensed form.

CROP—CORN.

| No. Plot. | EXPERIMENTERS. | | | | | |
|---|---|---|---|---|---|---|
| | S. S. SMITH. | | E. LERMOND. | | O. T. GOODRIDGE. | |
| | Lbs. per Acre. | | Lbs. per Acre. | | Lbs. per Acre. | |
| | Fodder. | Corn. | Fodder. | Corn. | Fodder | Corn. |
| 1 | 2,520 | 3,380 | 6,120 | 5,400 | † | 10,240 |
| 2 | 1,960 | 2,800 | 2,880 | * | – | 3,360 |
| 0 | 1,600 | 2,120 | 3,100 | * | – | 880 |
| 3 | 2,260 | 2,060 | 5,040 | 1,620 | – | 1,060 |
| 4 | 2,400 | 2,760 | 6,840 | 3,240 | – | 6,880 |
| 5 | 3,300 | 3,460 | 9,000 | 5,400 | – | 7,720 |
| 6 | 2,700 | 3,440 | 12,600 | 6,400 | – | 10,920 |
| 00 | 1,420 | 1,240 | 2,700 | * | – | – |
| 7 | 1,840 | 3,200 | 7,560 | 4,320 | – | – |

* No ears matured. † Fodder and corn weighed together.

Mr. Goodridge's soil was heavy clay, poor. He reports: "After the rains of the middle of July I never saw corn grow as fast as No. 6. No ears on any of the other plots to amount to anything. The corn on No. 6 was husked and compared with my field crop by its side, and yielded 1360 lbs. more husked corn to the acre."

Mr. Lermond's crop was on heavy clay. He reports: "The phosphoric acid on No. 2 appeared to have no effect—the difference in favor of No. 0 being due to previous condition of the soil. Corn full on Nos. 5 and 6 September 10; on manured plots 1 and 7 September 14."

Mr. Smith reports: "The land selected is light sandy plains, level and uniform in quality; had lain in grass more than fifteen years without manure. Broke it in spring of 1880 and planted in corn with 400 lbs. superphosphate to the acre and no other manure. Plowed again in 1881 and laid out in plots of one-twentieth of an acre, and fertilized according to instructions of Secretary of Board of Agriculture. A strip ten feet in width was left between each plot. Exactly the same number of hills was planted on each plot. Plots 1 and 7 were not manured with the same kind of barn manure. In conducting these experiments I have given my personal attention to all the details."

CROP—POTATOES.

| No. Plot. | EXPERIMENTERS. | | | |
|---|---|---|---|---|
| | G. T. FLETCHER. | T. B. HUNTER. | O. T. GOODRIDGE. | Z. A. GILBERT. |
| | Bu. per Acre. | Bu. per Acre. | Bu. per Acre. | Bu. per Acre. |
| 1 | *77.5 | †256 | 60 | – |
| 2 | 35 | 164 | 50 | 77.5 |
| 0 | 37.5 | 78.66 | 44 | 42.5 |
| 3 | 75 | 73 | 52 | 55 |
| 4 | 82.5 | 164 | 80.66 | 107.5 |
| 5 | 125 | 186.66 | 137.33 | 109 |
| 6 | 106 | 173.66 | 158 | 132 |
| 00 | – | 81.66 | – | – |
| 7 | – | †186.66 | – | ‡105 |

* Six cords stable manure to the acre.
† Different qualities barn manure used.
‡ Matfield fertilizer used, half ton to the acre.

It is not claimed that these experiments establish the results shown as fixed facts; they need to be repeated many times, and the results compared before complete reliance can be placed in them. It is claimed, however, that these results are indicators to a certain extent of the wants of the soil on which the experiments were tried, for the crops under trial. Furthermore, insomuch as the results reached by these different experimenters agree with each other and with other experiments of the same kind tried by other parties, they furnish additional testimony towards establishing the results as reliable. It is shown that on Mr. Smith's trial on sandy loam the crop responded to phosphoric acid and did not to potash. Other experiments have shown that highland soils have a supply of potash but are wanting in phosphoric acid. On the contrary, Mr. Lermond's clay soil gave no response to phosphoric acid, but gave an increase from the potash.

In every trial, both with corn and with potatoes, a more profitable and in most trials, it will be seen, a larger crop was grown from the half ration nitrogen in No. 6 than from the full ration in No. 5. This is an important fact in fertilization.

A further study of these results will indicate whether crops can be profitably grown from the application of chemical fertilizers alone; also a comparison with the plots fertilized with barn manure will show whether concentrated fertilizers are equally efficacious in crop production.

# MAINE STATE AGRICULTURAL SOCIETY.

The Maine State Agricultural Society held its nineteenth State fair at Lewiston, September 6, 7, 8 and 9, 1881. The stock departments were generally well filled. On account of the early date on which the exhibition was held, the farm product and horticultural departments were meagre. The weather was favorable, the attendance large, and the receipts sufficient to meet all the expenses of the fair and all liabilities of the society and still leave a surplus in the treasury. Since the fair the society has purchased the park at Lewiston with all its fixtures. Herewith is given a detailed statement of its transactions for the year, with receipts and expenditures, prepared for the society under the direction of the treasurer.

STATEMENT—*Showing number of entries, together with amount of entry fees received and premiums paid at the Maine State Fair, 1881.*

## PARK.

| CLASS. | No. of Entries. | Amount of Entry Fees received. | Amount of Premiums Paid. |
|---|---|---|---|
| CATTLE. | | | |
| Shorthorn Stock | 30 | $38 80 | $117 36 |
| Devon " | none. | - | - |
| Ayrshire " | none. | - | - |
| Hereford " | 18 | 22 00 | 76 91 |
| Jersey " | 31 | 32 30 | 95 40 |
| Maine Herd Book, Jersey Stock | 28 | 29 30 | 75 35 |
| Holstein Stock | 12 | 15 90 | 55 92 |
| Polled Angus Stock | 2 | 1 40 | 5 36 |
| Grade or Native Stock | 44 | 25 80 | 47 00 |
| Sweepstakes, Bulls | 8 | 12 00 | 15 00 |
| Working Oxen and Steers | 17 | 28 20 | 68 00 |
| Trained Steers | 4 | 4 80 | 12 00 |
| Fat Cattle | 3 | 9 00 | 30 00 |
| Matched Oxen | 6 | 8 20 | 26 00 |
| Pulling Oxen and Town Teams | 23 | 91 50 | 155 00 |
| Pulling Steers | 7 | 13 20 | 37 00 |
| | 233 | 332 40 | 816 30 |

STATEMENT SHOWING ENTRIES, ETC.—*Continued.*

| CLASS. | No. of Entries. | Amount of Entry Fees Received. | Amount of Premiums paid. |
|---|---|---|---|
| HORSES. | | | |
| Stallions for general use | 4 | $34 00 | $85 00 |
| " 5 years old and under 6 | 1 | 4 80 | none. |
| " 4 " " 5 | 5 | 12 00 | 30 00 |
| " 3 " " 4 | 6 | 18 00 | 30 00 |
| Draft Stallions | 1 | 2 50 | 10 05 |
| Brood Mares | 12 | 36 00 | 30 00 |
| Geldings and Mares, 4 years old and over | 26 | 78 00 | 60 00 |
| Geldings and Fillies, 3 years old and under 4 | 9 | 12 00 | *45 00 |
| Stallions, Geldings & Fillies, 2 yrs. old and under 3 | 16 | 25 60 | 48 00 |
| Stallions, Geldings & Fillies, 1 yr. old and under 2 | 7 | 10 50 | 30 00 |
| Draft Horses, 3 pairs, 4 single | 7 | 12 70 | 38 00 |
| Gents' Driving Horses | 7 | 70 00 | 100 00 |
| Walking Horses | 27 | 40 50 | 15 00 |
| Trained Colts | none. | - | - |
| Matched Driving Horses | 3 | 14 40 | 40 00 |
| General Tilton's Special | 8 | - | †—— |
| | 139 | 371 00 | 561 05 |
| Trotting Horses | 108 | 1,667 50 | 2,235 00 |
| SHEEP. | | | |
| Long Wooled Sheep (Leicester and Cotswolds) | 21 | 29 40 | 97 36 |
| Oxford Downs | 6 | 8 40 | 32 16 |
| South Downs | 5 | 7 00 | 26 80 |
| Merinos | 19 | 26 60 | 79 38 |
| Breeding Merino Ewes | 3 | 3 90 | 13 00 |
| Shropshires | 6 | 8 40 | 26 80 |
| Texels | 6 | 8 40 | 32 16 |
| Sweepstakes Bucks | 4 | 4 00 | 10 00 |
| | 70 | 96 10 | 317 66 |
| SWINE. | | | |
| Large breeds | 20 | 11 50 | 41 70 |
| Small breeds | none. | - | - |
| Sweepstakes Boars | 3 | 2 40 | 8 00 |
| | 23 | 13 90 | 49 70 |
| Agricultural Implements | 257 | 56 00 | ‡79 00 |
| Plowing Match | 10 | - | 26 00 |

ACTUAL NUMBER OF ANIMALS REPRESENTED.

| | | | |
|---|---|---|---|
| Bulls, 29; Bull Calves, 27 | 56 | 177 50 | 488 30 |
| Cows, 35; Heifers, 45; Heifer Calves, 21 | 101 | | |
| Oxen, (pairs) 32; Steers, (pairs) 25 | 57 | 154 90 | 328 00 |
| Horses, for exhibition | 145 | 371 00 | *561 05 |
| Trotting Horses | 68 | 1,667 50 | 2,235 00 |
| Sheep and Lambs | 159 | 96 10 | 317 66 |
| Boars and Sows | 15 | 13 90 | 49 70 |
| Litters of Pigs | 5 | | |

*1 Diploma. †Premiums paid by Gen. Tilton. ‡2 Diplomas.

STATEMENT SHOWING ENTRIES, ETC.—*Concluded.*

## HALL.

| CLASS. | Number of Entries. | Premiums Paid. | Silver Medals. | Diplomas. |
|---|---|---|---|---|
| Grain, seeds and sheaves | 45 | $51 75 | – | – |
| Roots and vegetables | 49 | 33 00 | – | – |
| Apples | 320 | 52 00 | – | – |
| Pears | 129 | 31 00 | – | – |
| Grapes | 19 | 19 75 | – | – |
| Plums | 14 | 2 50 | – | – |
| Miscellaneous fruits | 7 | 7 60 | – | – |
| Flowers | 81 | 79 00 | – | – |
| Butter, cheese and dairy implements | 52 | 131 00 | – | – |
| Honey, maple sugar and syrup | 4 | – | – | 1 |
| Household articles | 2 | 4 00 | – | – |
| Brass, tin, copper, iron work and stoves | 17 | 14 00 | – | – |
| Maine Corporation manufactures | 61 | – | 4 | 13 |
| Needle and fancy work | 163 | 98 00 | – | 2 |
| Articles of leather, saddlery, etc | 8 | – | 3 | 5 |
| India rubber goods | 2 | – | 1 | 1 |
| Carriages and sleighs | 1 | 8 00 | – | – |
| Hardware, cutlery, etc | none. | – | – | – |
| Bread and table luxuries | 19 | 24 00 | – | – |
| Canned fruits, preserves, pickles, etc | 32 | 25 00 | 1 | – |
| Printing and binding | 2 | – | – | 2 |
| Pictorial and industrial arts | 33 | 26 00 | 1 | 2 |
| Household furniture and carpenter's work | 2 | 1 00 | 1 | – |
| Millinery, hats, caps, furs and regalias | 1 | 50 | – | – |
| Musical, surgical instruments, etc | 7 | 5 00 | 3 | 1 |
| Mineral and botanical | 4 | 15 00 | 1 | 1 |
| Miscellaneous and new inventions | 70 | 5 00 | *2 | 14 |
| | 1,144 | 633 00 | 17 | 42 |
| Baby show | 29 | 45 00 | – | – |
| | 1,173 | 678 00 | 17 | 42 |

No entry fees collected at the hall.

*8 Bronze Medals.

STATEMENT—*Showing Income and Expenditures of the Maine State Agricultural Society on account of the Fair of 1881, and for other purposes.*

| INCOME. | On Park Account. | On Hall Account. | On Gen'l Account. | Total. |
|---|---|---|---|---|
| From sale of tickets, (single admission) | $6,426 00 | $1,918 05 | – | $8,344 05 |
| " " (railroad) | 3,310 77 | 365 10 | – | 3,675 87 |
| " " (grand stand) | 473 30 | – | – | 473 30 |
| " " (exhibitors) | 16 50 | 74 00 | – | 90 50 |
| " " (tent) | 22 00 | – | – | 22 00 |
| | 10,248 57 | 2,357 15 | | 12,605 72 |
| From entry fees on stock and exhibition horses, *net* | 813 40 | – | – | 813 40 |
| " entry fees on trotting horses, *net* | 1,667 50 | – | – | 1,667 50 |
| " " agricultural implements | 56 00 | – | – | 56 00 |
| " suspension money collected | 41 50 | – | – | 41 50 |
| " ground rents | 519 00 | – | – | 519 00 |
| " tent rents | 71 00 | – | – | 71 00 |
| " commissions on sales | – | 20 00 | – | 20 00 |
| " 189 life members | – | – | $1,890 00 | 1,890 00 |
| Net income for 1881 | 13,416 97 | 2,377 15 | 1,890 00 | 17,684 12 |
| Balance from account, 1880 | – | – | 652 52 | – |
| Net income for 1881 | – | – | 17,684 12 | – |
| | | | | 18,336 64 |

| EXPENDITURES. | On Park Account. | On Hall Account. | General Expenses. | Total. |
|---|---|---|---|---|
| For materials, (lumber, hardware, etc.) | $802 48 | $53 37 | – | $855 85 |
| labor | 1,123 85 | 374 58 | $134 38 | 1,632 81 |
| stationery and printing | 125 38 | 33 89 | 261 41 | 420 68 |
| advertising | – | – | 207 87 | 207 87 |
| postage, telegraphing and express | 11 39 | 4 00 | 98 67 | 114 06 |
| hay, grain and straw, *net* | 1,004 73 | – | – | 1,004 73 |
| shavings | 52 50 | – | – | 52 50 |
| stabling cattle and sheep | 8 25 | – | – | 8 25 |
| transportation | 210 95 | 18 36 | 4 75 | 234 06 |
| tools, signs and furniture, (purchased and hired) | 90 75 | 15 24 | 30 28 | 136 27 |
| rent of park | 1,000 00 | – | – | 1,000 00 |
| improvement on grounds | 700 00 | – | – | 700 00 |
| use of tent, etc., (agricultural implement department) | 107 50 | – | – | 107 50 |
| national trotting association | 50 00 | – | – | 50 00 |
| caps, pins, ribbons and badges | 39 95 | – | – | 39 95 |
| diplomas and medals, except bill for engraving, cases, &c, not yet ascertain'd | 3 30 | 96 20 | – | 99 50 |
| ice, ice water, and fixtures for same | 39 00 | 1 55 | – | 40 55 |
| telephone to grounds | 29 00 | – | – | 29 00 |
| music | 80 00 | 85 00 | – | 165 00 |
| salaries | – | – | 1,350 00 | 1,350 00 |
| miscellaneous | 12 70 | 3 00 | 10 42 | 26 12 |
| | 5,491 73 | 685 19 | 2,097 78 | 8,274 70 |
| Premiums paid | 4,084 71 | 678 00 | – | 4,762 71 |
| Expenditures for account, Fair 1881 | 9,576 44 | 1,363 19 | 2,097 78 | 13,037 41 |

STATEMENT SHOWING INCOME AND EXPENDITURES—Concluded.

| COMPARATIVE STATEMENT. | On Park Account. | On Hall Account. | On Gen'l Account. | Total. |
|---|---|---|---|---|
| Income for 1881 | $13,416 97 | $2,377 15 | $1,890 00 | $17,684 12 |
| Expenditures for account Fair, 1881 | 9,576 44 | 1,363 19 | 2,097 78 | 13,037 41 |
| Excess of receipts over expenditures for Fair, 1881 Park | 3,840 53 | – | – | – |
| Excess of receipts over expenditures for Fair, 1881 Hall | 1,013 96 | – | – | – |
| | | 4,854 49 | – | – |
| Less balance of general account | – | 207 78 | – | – |
| Net gain, Fair of 1881 | – | 4,646 71 | – | – |
| Balance from account of 1880 | – | 652 52 | – | – |
| | | | 5,299 23 | – |
| Amount paid on bills and premiums of former years | 114 90 | – | – | – |
| Amount paid for purchase of Park | 5,000 00 | – | – | – |
| | | 5,114 90 | – | – |
| Balance carried to new account | – | 184 33 | 5,299 23 | – |

H. S. OSGOOD, *Treasurer.*

TREASURER'S OFFICE,
Augusta, December 15, 1881.

# Financial Statement of Agricultural Societies for the Year 1881.

| SOCIETIES. | Amount received from State. | Amount raised by Society. | Total receipts for the year. | Total amount of premiums and gratuities awarded. | Incidental expenses for the year. | Whole amount of disbursements for the year. | Value of property belonging to the Society. | Amount of liabilities of the Society. | Awards for plowing at exhibition. | For bulls and bull calves. | For working oxen, 4 years old and over | For steers under 4 years old. | For milk cows. | For heifers and heifer calves. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * Androscoggin | - | - | - | - | - | - | - | - | - | 7 00 | 3 00 | 4 00 | 35 00 | 5 00 |
| Aroostook County | $71 00 | 122 00 | 193 00 | 129 50 | 38 60 | 193 10 | - | - | - | 4 75 | 3 00 | 6 50 | 19 00 | 15 00 |
| Aroostook, North | 74 00 | 103 91 | 177 91 | 153 45 | 75 43 | 228 88 | - | 50 97 | - | 52 00 | 87 00 | 29 00 | 126 00 | 18 00 |
| Cumberland County | 378 00 | - | - | 1,327 00 | 660 86 | 1,864 61 | - | - | 17 00 | 19 00 | 64 00 | 62 50 | 15 00 | 9 00 |
| Franklin County | 119 00 | 931 24 | 1,050 24 | 436 25 | 300 00 | 1,340 55 | 500 00 | 200 00 | - | 2 25 | 29 50 | 24 60 | 13 50 | 4 50 |
| Franklin, North | 42 00 | 418 18 | 460 18 | 297 25 | 100 00 | 437 00 | - | - | - | 1 75 | 4 00 | 5 45 | 2 40 | 2 05 |
| Franklin, Central | 20 00 | 98 00 | 155 30 | 82 80 | 14 25 | 118 08 | 500 00 | 400 00 | - | 20 00 | 19 00 | 10 25 | 20 00 | 16 50 |
| Knox | 172 00 | 708 23 | 880 23 | 438 35 | 353 00 | 791 75 | 160 00 | - | - | 10 50 | - | 17 00 | 13 25 | 17 75 |
| Knox, North | - | 156 00 | 692 28 | 223 45 | 463 83 | 692 28 | - | - | 3 00 | 15 00 | 64 00 | 33 50 | 41 50 | 23 50 |
| Kennebec | 278 00 | 827 32 | 1,105 00 | 626 25 | 414 28 | 1,000 40 | 450 00 | - | - | 5 50 | 6 00 | 3 50 | 6 00 | 3 50 |
| Kennebec, North | 122 00 | 201 03 | 323 03 | 248 00 | 157 66 | 320 40 | 2,000 00 | 168 00 | - | 12 00 | 30 00 | 10 00 | 14 00 | 15 00 |
| Lincoln County | 256 00 | 721 83 | 977 80 | 241 75 | 666 85 | 908 50 | 150 00 | - | - | 63 00 | 83 06 | 91 05 | 27 00 | 28 00 |
| Oxford | 208 00 | 4,812 46 | 5,020 46 | 1,151 09 | 4,151 90 | 5,539 70 | 7,033 00 | 2,349 49 | 13 00 | 14 00 | 48 00 | 30 00 | 5 00 | 10 00 |
| Oxford, West | 68 00 | 878 15 | 946 15 | 361 60 | 232 32 | 593 92 | 2,000 00 | 400 00 | - | 16 00 | 42 00 | 11 00 | 12 00 | 9 00 |
| Ossipee Valley | 200 00 | 781 06 | 981 56 | 486 43 | - | 780 00 | 2,500 00 | 156 71 | - | 4 00 | 8 00 | 6 00 | 9 00 | 4 25 |
| Penobscot and Aroostook | 73 00 | 118 00 | 191 00 | 76 00 | 88 00 | 153 00 | - | - | - | - | - | - | - | - |
| Penobscot County | - | 265 96 | 265 96 | 93 00 | - | 200 00 | - | - | - | 20 50 | 18 00 | 17 00 | 10 50 | 17 00 |
| Penobscot, West | 289 00 | 693 70 | 982 70 | 296 40 | - | - | 4,000 00 | 640 00 | - | 4 00 | 3 00 | 9 00 | 6 50 | 10 50 |
| Penobscot, North | 37 00 | 60 00 | 97 00 | 98 00 | 25 00 | - | - | 50 00 | - | 16 75 | 28 50 | 11 25 | 15 50 | 8 00 |
| Penobscot, Central | 45 00 | 88 64 | 133 64 | 179 00 | 20 37 | 122 52 | - | - | - | 2 50 | 7 50 | 3 75 | 2 50 | 1 75 |
| Piscataquis, East | 23 00 | 36 00 | 64 50 | 86 45 | 21 50 | 64 77 | 5 00 | - | - | | | | | |

*Consolidated with State Fair.

FINANCIAL STATEMENT OF AGRICULTURAL SOCIETIES FOR THE YEAR 1881—*Continued.*

| SOCIETIES. | Amount received from State. | Amount raised by Society. | Total receipts for the year. | Total amount of premiums and gratuities awarded. | Incidental expenses for the year. | Whole amount of disbursements for the year. | Value of property belonging to the Society. | Amount of liabilities of the Society. | Awards for plowing at exhibition | For bulls and bull calves. | For working oxen, 4 years old and over. | For steers under 4 years old. | For milk cows | For heifers and heifer calves. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Piscataquis, Central | $112 00 | 374 97 | 886 97 | 336 90 | 75 08 | 411 98 | 100 00 | 120 00 | – | 12 50 | 20 00 | 10 00 | 14 00 | 10 00 |
| Piscataquis, West | 13 00 | 73 25 | 86 25 | 63 45 | 34 00 | 97 45 | – | 11 21 | – | 1 75 | 22 50 | 4 75 | 7 00 | 1 85 |
| Pomological, State | 281 00 | 515 70 | 796 70 | 549 00 | 414 13 | 832 50 | 444 00 | 439 00 | – | – | – | – | – | – |
| Sagadahoc | 192 00 | 2,004 00 | 2,196 00 | 1,114 00 | 1,750 00 | 2,864 00 | 5,000 00 | 150 00 | – | 25 00 | 101 00 | 38 00 | 37 00 | 39 00 |
| Somerset, East | 155 00 | 551 54 | 706 54 | 375 90 | 103 60 | 659 89 | 2 500 00 | 806 91 | – | 9 75 | 19 25 | 21 75 | 26 00 | 16 50 |
| Shapleigh and Acton | 98 00 | 304 60 | 402 60 | 363 00 | 38 30 | 401 30 | 4,000 00 | – | – | 8 25 | 46 00 | 9 75 | 10 50 | 5 50 |
| Waldo County | – | 721 00 | 721 00 | 380 00 | 88 68 | 723 91 | 2,000 00 | 35 00 | – | 3 00 | 9 00 | 6 00 | 6 00 | 5 00 |
| Waldo, North | 222 50 | 345 00 | 567 50 | 402 55 | 86 80 | 489 35 | – | – | – | 17 00 | 13 00 | 20 00 | 12 00 | 7 00 |
| Waldo and Penobscot | 130 00 | 1,055 00 | 1,185 00 | 695 45 | 658 50 | 1,353 95 | 2,500 00 | – | – | 18 00 | 26 00 | 13 00 | 13 00 | 8 00 |
| Washington County | 204 00 | 921 81 | 1,125 81 | 648 40 | 140 30 | 1,022 00 | 1,680 00 | – | – | 38 50 | 14 00 | 18 00 | 20 00 | 33 00 |
| Washington, West | 196 00 | 939 00 | 1,135 00 | 791 03 | 335 03 | 1,126 06 | – | – | – | 52 50 | 44 00 | 30 50 | 42 00 | 18 50 |
| York County | 174 00 | 818 42 | 992 42 | 697 00 | 376 33 | 1,073 33 | 150 00 | – | 21 00 | 23 00 | 33 50 | 22 00 | 28 00 | 17 00 |

FINANCIAL STATEMENT OF AGRICULTURAL SOCIETIES FOR THE YEAR 1881—*Continued.*

| SOCIETIES. | For fat cattle. | For trials of speed. | For stallions. | For breeding mares. | For other horses and colts. | For swine. | For sheep. | For poultry. | Total amount awarded for live stock. | Total amount awarded for horses, not purses. | Amount awarded for Indian corn. | For wheat. | For rye. | For barley. | For oats. | For buckwheat. | For beans. | Peas. | For potatoes. | For carrots. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Androscoggin | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Aroostook County | - | - | - | $2 00 | 25 00 | 9 00 | 18 00 | 2 00 | 83 00 | 27 00 | 1 00 | - | - | 2 00 | 2 00 | - | 1 00 | - | 3 00 | 75 |
| Aroostook, North | - | - | $6 00 | 6 00 | 22 00 | 4 00 | 14 00 | - | 66 25 | 34 00 | - | 75 | - | - | 75 | - | 50 | - | 1 50 | - |
| Cumberland County | $5 00 | 650 00 | 68 00 | 31 00 | 67 50 | 8 00 | 47 00 | - | 409 00 | 166 50 | 2 00 | - | - | - | - | - | - | - | - | - |
| Franklin County | 7 50 | 102 00 | 12 50 | 3 00 | 29 25 | 5 00 | 13 50 | 4 25 | 199 75 | 44 75 | 1 30 | - | - | - | - | - | - | - | - | 30 |
| Franklin, North | - | 105 00 | 3 00 | 4 50 | 13 70 | 6 50 | 10 00 | 10 75 | 101 60 | 21 20 | 4 20 | 8 00 | - | 1 00 | 1 00 | - | 2 95 | - | 5 45 | 45 |
| Franklin, Central | 1 65 | | - | 1 00 | 4 80 | 2 75 | 2 25 | 60 | 22 90 | 5 80 | 2 00 | 2 00 | - | - | 2 50 | - | 1 00 | - | 1 00 | 25 |
| Knox | 11 00 | 58 00 | 12 00 | 5 00 | 23 50 | 10 25 | 9 00 | 11 25 | 152 25 | 73 50 | 8 50 | 6 00 | 3 00 | - | - | - | 5 50 | 2 50 | 7 00 | 1 50 |
| Knox, North | 3 50 | - | 3 00 | 4 50 | 9 75 | 5 50 | 5 25 | 2 50 | 83 00 | 14 25 | 6 25 | 5 50 | 1 50 | 2 50 | 3 00 | - | 50 | - | 3 00 | - |
| Kennebec | 7 50 | 104 00 | 16 00 | 6 00 | 30 00 | 8 00 | 21 50 | 10 50 | 225 00 | 52 00 | 8 00 | 7 00 | - | 3 00 | - | - | - | - | 3 00 | - |
| Kennebec, North | 5 00 | - | 14 00 | 7 00 | 22 00 | 6 00 | 24 00 | - | 116 00 | 43 00 | - | - | - | - | - | - | - | - | - | - |
| Lincoln County | 4 50 | 70 00 | 6 00 | 5 00 | 3 00 | - | 3 00 | 3 25 | 43 50 | 14 00 | 7 50 | 6 00 | 1 00 | 1 00 | 1 50 | 1 00 | 1 50 | 50 | 1 75 | - |
| Oxford | 10 00 | 310 00 | 52 00 | 10 00 | 39 00 | 13 00 | 37 00 | 16 00 | 422 11 | 101 00 | 25 50 | 26 25 | - | 4 00 | - | - | 3 00 | - | 8 75 | 50 |
| Oxford, West | 7 00 | 70 00 | 5 00 | 8 25 | 8 00 | 11 00 | 16 50 | 3 50 | 145 00 | 21 25 | 3 75 | 4 50 | - | - | 2 00 | - | - | - | 4 25 | 25 |
| Ossipee Valley | 5 00 | 175 00 | 8 00 | 7 00 | 38 00 | - | 19 00 | 2 00 | 116 00 | 53 00 | 5 00 | 5 00 | - | - | 3 00 | - | - | - | 2 00 | - |
| Penobscot and Aroostook | - | 8 00 | 3 50 | - | 8 50 | - | 8 00 | - | 39 25 | 12 00 | 50 | - | - | 50 | 50 | - | - | - | 50 | - |
| Penobscot County | - | - | - | - | - | - | - | - | - | - | 6 00 | 6 00 | - | - | - | - | 2 50 | 2 50 | 3 00 | - |
| Penobscot, West | 6 00 | - | 12 50 | 6 00 | 34 50 | 8 00 | 15 75 | 1 00 | 113 75 | 53 00 | 20 95 | 4 50 | - | 1 00 | 1 75 | - | 1 75 | 1 75 | 2 40 | - |
| Penobscot, North | - | 3 00 | - | 3 00 | 7 50 | - | 6 00 | 1 50 | 34 50 | - | 3 00 | 3 00 | - | 2 00 | 2 00 | - | - | - | 50 | - |
| Penobscot, Central | - | - | 3 00 | 2 50 | 29 50 | - | 13 50 | - | 93 50 | 35 00 | 2 40 | 50 | - | - | 40 | - | - | 40 | - | 50 |
| Piscataquis, East | - | 5 00 | 3 00 | 3 00 | 6 50 | 4 00 | 6 00 | 1 75 | 28 00 | 12 50 | 75 | - | - | - | - | - | 75 | 75 | 75 | - |

*Consolidated with State Fair.

FINANCIAL STATEMENT OF AGRICULTURAL SOCIETIES FOR THE YEAR 1881—*Continued.*

| SOCIETIES. | For fat cattle. | For trials of speed. | For stallions. | For breeding mares. | For other horses and colts. | For swine. | For sheep. | For poultry. | Total amount awarded for live stock. | Total amount awarded for horses, not purses. | Amount awarded for Indian corn. | For wheat. | For rye. | For barley. | For oats. | For buckwheat. | For beans. | Peas. | For potatoes. | For carrots. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Piscataquis, Central | – | 137 00 | 5 00 | 6 00 | 154 50 | 10 00 | 14 50 | 6 50 | 93 50 | 38 50 | 10 00 | – | – | – | – | – | – | – | 50 | 50 |
| Piscataquis, West | – | – | 2 00 | 1 00 | 11 00 | – | 1 75 | – | 37 85 | 15 75 | 1 25 | – | – | – | – | – | 50 | – | – | – |
| Pomological, State | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Sagadahoc | 11 00 | 445 00 | 16 00 | 25 00 | 34 00 | 8 00 | 28 00 | 18 00 | 305 00 | 75 00 | 41 75 | 11 00 | 4 75 | 4 75 | 7 75 | – | 6 00 | 1 50 | 7 53 | 75 |
| Somerset, East | – | 175 00 | 5 00 | 3 75 | 23 75 | 5 75 | 12 00 | - | 111 00 | 28 00 | 10 50 | 10 25 | – | – | – | – | – | – | – | – |
| Shapleigh and Acton | 6 00 | 80 00 | 2 00 | 3 00 | 28 00 | 11 50 | 7 75 | 6 00 | 116 25 | 28 00 | 2 75 | 2 25 | 2 25 | 2 25 | 2 25 | – | 9 00 | 1 75 | 1 50 | 1 50 |
| Waldo County | 2 00 | 87 00 | 4 00 | 2 00 | 11 00 | 4 00 | 5 00 | 4 00 | 44 00 | 17 00 | 2 00 | 2 00 | 2 00 | 2 00 | 2 00 | 2 00 | 2 00 | – | 1 00 | 1 00 |
| Waldo, North | 5 00 | 171 00 | 14 25 | 6 00 | 20 00 | 75 | 17 25 | 1 50 | 93 50 | 22 25 | 6 00 | 8 00 | – | – | | – | 2 00 | – | 5 00 | 1 25 |
| Waldo and Penobscot | 6 00 | 369 00 | 36 00 | 7 00 | 32 00 | 8 00 | 12 00 | 12 00 | 116 00 | 75 00 | 7 00 | 5 00 | – | – | 2 00 | – | 1 50 | 1 00 | 1 00 | 1 00 |
| Washington County | 5 00 | 180 00 | – | 12 00 | 24 50 | 20 00 | 25 00 | 8 00 | 181 00 | 36 50 | 4 00 | 8 75 | 25 | 1 00 | 3 25 | 2 75 | 24 50 | 75 | 10 75 | 2 75 |
| Washington, West | 5 00 | 245 00 | 11 00 | 11 00 | 44 00 | 15 00 | 22 00 | 28 00 | 257 52 | 63 00 | 85 | 2 00 | – | 2 25 | 2 50 | 1 00 | 2 50 | 1 75 | 4 75 | 5 75 |
| York County | 9 00 | 403 00 | 15 00 | 7 00 | 30 00 | 7 00 | 8 00 | 7 00 | 175 50 | 52 00 | 7 00 | 2 00 | 1 00 | 1 50 | 1 00 | – | 1 50 | 1 00 | 4 00 | – |

## FINANCIAL STATEMENT OF AGRICULTURAL SOCIETIES FOR THE YEAR 1881—*Continued.*

| SOCIETIES. | For beets | For onions | For turnips | For cabbage | Total am't awarded for grain and root crops | For any other cultivated crops | For fruits and flowers | For honey, sugar and syrup | For bread, butter and cheese | Agricultural implements | Household manufactures and needle work | Manufactures of wood, iron and leather | Other mechanical products | All objects not enumerated above | NUMBER OF ANIMALS EXHIBITED. No. of bulls and bull calves | No. of cows | No. of heifers | No. heifer calv's | No. working oxen (pairs.) | No. prs. steers | No. fat cattle | Total No. of cattle | No. horses, colts | No. sheep | No. swine | No. poultry |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Androscoggin | – | – | – | – | – | – | – | – | – | – | – | – | – | – | 11 | 28 | 15 | 3 | 2 | 7 | – | 75 | 36 | 91 | 15 | 38 |
| Aroostook County | – 0 75 | | 1 00 | 50 | 12 00 | – | 1 00 | – | – | – | 6 50 | – | – | – | 10 | 55 | 21 | 9 | 6 | 7 | – | 121 | 44 | 65 | 5 | – |
| Aroostook, North | 0 75 | – | 1 00 | – | 5 25 | 3 00 | 23 00 | 4 25 | 9 00 | – | 8 70 | – | – | 8 50 | 18 | 29 | 27 | 10 | 19 | 5 | 1 | 109 | 37 | 23 | 14 | – |
| Cumberland County | – | – | – | – | – | – | 17 50 | – | 16 00 | 15 00 | 23 50 | – | – | 2 85 | 11 | 16 | 18 | 11 | 42 | 65 | 6 | 271 | 90 | 92 | 23 | 36 |
| Franklin County | – | – | 50 | – | 2 10 | – | 8 00 | 3 00 | 4 00 | 5 50 | 24 45 | 2 50 | – | 2 85 | – | 29 | 14 | – | 25 | 30 | – | 98 | 48 | 42 | 23 | 54 |
| Franklin, North | 45 | – | 25 | 45 | 24 20 | – | 5 30 | – | 4 00 | 2 00 | 30 80 | 5 25 | – | 8 10 | 3 | 5 | 4 | 1 | 11 | 16 | 3 | 55 | 16 | 12 | 13 | 6 |
| Franklin, Central | 45 | – | 45 | 25 | 8 50 | 2 25 | 4 25 | – | 2 25 | 50 | 15 00 | – | 2 00 | 9 75 | 8 | 27 | 21 | 5 | 12 | 16 | 6 | 123 | 34 | 41 | 22 | 60 |
| Knox | 1 50 | – | 1 00 | 3 50 | 50 00 | 7 00 | 46 25 | 3 00 | 24 00 | 1 75 | 34 00 | 3 00 | – | 23 25 | 6 | 8 | 12 | 3 | 4 | 19 | 4 | 115 | 38 | 14 | 17 | 12 |
| Knox, North | 50 | – | 50 | 1 50 | 24 75 | – | 17 00 | 4 55 | 15 00 | 6 60 | 14 15 | – | – | – | 14 | 36 | 25 | 15 | 124 | 70 | 12 | 480 | 43 | 48 | 41 | 29 |
| Kennebec | 3 00 | – | 3 00 | – | 27 00 | – | 27 00 | 50 | 40 00 | 13 00 | 38 50 | 14 00 | 4 50 | 80 75 | 4 | 10 | 15 | – | 25 | 20 | 4 | 64 | 25 | 125 | 25 | – |
| Kennebec, North | – | – | – | – | – | – | 24 00 | 2 00 | 10 00 | 2 00 | 16 00 | – | – | 35 00 | 5 | 9 | 10 | 1 | 7 | 9 | 12 | 68 | 32 | 5 | – | 8 |
| Lincoln County | 1 00 | – | 50 | 75 | 24 00 | 3 00 | 23 00 | – | 2 75 | 50 | 12 25 | 2 00 | – | 55 00 | 16 | 15 | 23 | 2 | 23 | 53 | 2 | 250 | 37 | 98 | 51 | 62 |
| Oxford | 3 75 | – | 50 | 75 | 75 00 | 9 25 | 38 00 | 1 15 | 41 00 | 33 00 | 32 60 | 49 55 | 8 00 | 141 09 | 7 | 2 | 7 | 3 | 38 | 19 | 3 | 136 | 35 | 26 | 19 | 30 |
| Oxford, West | 25 | – | 25 | 25 | 19 00 | 6 00 | 13 00 | 7 35 | 11 50 | 5 00 | 30 80 | – | – | 10 00 | 20 | 35 | 10 | – | 110 | 75 | 8 | 423 | 200 | 21 | – | 5 |
| Ossipee Valley | – | – | – | – | 10 00 | 12 00 | 12 00 | – | 6 00 | – | – | – | 6 00 | – | 5 | 6 | 11 | – | 2 | 4 | – | 31 | 20 | 26 | – | – |
| Penobscot and Aroostook | – | – | – | – | 3 50 | – | 3 75 | – | 3 50 | – | 6 50 | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Penobscot County | – | – | 3 00 | – | 23 00 | – | – | – | 6 00 | – | 3 00 | – | – | 61 00 | 10 | 11 | 20 | – | 14 | 31 | 6 | 90 | 70 | 78 | 12 | 15 |
| Penobscot, West | 1 40 | – | 1 20 | – | 36 70 | 7 00 | 18 80 | 7 30 | 24 25 | 4 00 | 27 60 | – | 4 00 | – | 3 | 11 | 8 | 6 | 5 | 8 | – | 41 | 22 | 30 | – | 12 |
| Penobscot, North | – | – | – | 50 | 10 00 | – | 6 00 | 1 00 | 3 50 | – | 2 50 | – | – | – | 6 | 9 | 6 | 1 | 13 | 9 | – | 66 | 23 | 36 | – | – |
| Penobscot, Central | 1 00 | 1 00 | 1 00 | 1 00 | 8 20 | – | 12 65 | – | 5 75 | 1 50 | 18 50 | – | – | 4 00 | 4 | 9 | 7 | 2 | 5 | 10 | – | 55 | 35 | 22 | 2 | 24 |
| Piscataquis, East | 75 | – | 75 | 50 | 7 25 | 2 25 | 2 00 | – | 4 25 | – | 5 60 | – | – | 20 00 | | | | | | | | | | | | |

*Consolidated with State Fair.

## FINANCIAL STATEMENT OF AGRICULTURAL SOCIETIES FOR THE YEAR 1881—*Concluded.*

| SOCIETIES. | For beets. | For onions. | For turnips. | For cabbage. | Total am't awarded for grain and root crops. | For any other cultivated crops. | For fruits and flowers. | For honey, sugar and syrup. | For bread, butter and cheese. | Agricultural implements. | Household manufactures and needle work | Manufactures of wood, iron and leather. | Other mechanical products. | All objects not enumerated above. | NUMBER OF ANIMALS EXHIBITED. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | No. of bulls and bull calves. | No. of cows. | No. of heifers | No. heifer calv's | No working oxen (pairs.) | No. prs. steers. | No. fat cattle. | Total No. of cattle. | No. horses, colts | No. sheep. | No. swine. | No. poultry. |
| Piscataquis, Central | $.50 | - | 25 | 50 | 12 50 | | 12 75 | 1 50 | 17 50 | - | 16 90 | - | - | 4 00 | 10 | 8 | 10 | 4 | 12 | 16 | - | 88 | 50 | 30 | 10 | 35 |
| Piscataquis, West | 10 | - | 10 | 10 | 2 05 | 1 10 | 2 40 | - | - | - | 2 95 | - | - | 1 35 | 4 | 14 | 7 | 2 | 10 | 10 | - | 80 | 25 | 20 | - | - |
| Pomological, State | - | - | - | - | - | - | 549 00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Sagadahoc | 1 25 | - | 75 | 1 75 | 89 50 | 11 00 | 39 50 | 2 00 | 20 00 | 22 00 | 38 75 | 8 00 | 8 75 | 49 50 | 11 | 30 | 36 | 15 | 58 | 60 | 10 | 348 | 84 | 61 | 26 | 100 |
| Somerset, East | - | - | - | - | 20 75 | - | 4 70 | - | 12 00 | - | 22 30 | - | - | - | 12 | 25 | 31 | 5 | 13 | 23 | 16 | 125 | 60 | 75 | 25 | - |
| Shapleigh and Acton | 3 00 | - | 2 25 | 1 50 | 32 25 | 11 50 | 6 50 | - | 5 75 | - | 49 00 | - | - | 30 75 | 12 | 12 | 13 | 5 | 36 | 24 | 6 | 168 | 43 | 30 | 30 | 60 |
| Waldo County | 1 00 | - | 1 00 | 1 00 | 19 00 | 2 00 | 9 00 | 2 00 | 8 00 | 4 00 | 6 75 | 2 50 | 1 00 | 27 75 | 8 | 30 | 7 | 8 | 4 | 8 | 3 | 65 | 22 | 12 | 15 | 5 |
| Waldo, North | 75 | - | 1 25 | 50 | 24 75 | 2 75 | 8 00 | 1 75 | 9 00 | - | 26 25 | - | - | 8 00 | 5 | 12 | 14 | - | 16 | 14 | 2 | 120 | 38 | 70 | 4 | 18 |
| Waldo and Penobscot | 3 00 | - | 1 50 | 1 00 | 24 00 | 7 00 | 16 50 | 1 50 | 4 50 | - | 59 00 | 3 00 | - | 19 95 | 8 | 6 | 9 | 3 | 6 | 8 | 6 | 80 | 45 | 56 | 12 | 120 |
| Washington County | 2 25 | - | 2 50 | 2 25 | 68 50 | - | 49 00 | 2 25 | 11 50 | - | 49 50 | 14 00 | 4 25 | 54 70 | 21 | 21 | 25 | 14 | 6 | 12 | 18 | 117 | 41 | 46 | 9 | 42 |
| Washington, West | 5 75 | - | 5 75 | - | 34 85 | 7 75 | 11 75 | 1 50 | 15 00 | 7 00 | 57 62 | 9 50 | 2 60 | 80 96 | 16 | 16 | 14 | 6 | 19 | 9 | 2 | 112 | 42 | 29 | 50 | 158 |
| York County | - | - | 1 50 | 1 00 | 21 50 | - | 22 00 | 1 00 | 10 50 | - | - | - | - | 11 50 | 18 | 37 | 19 | 11 | 26 | 17 | 14 | 168 | 36 | 27 | 19 | 24 |

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