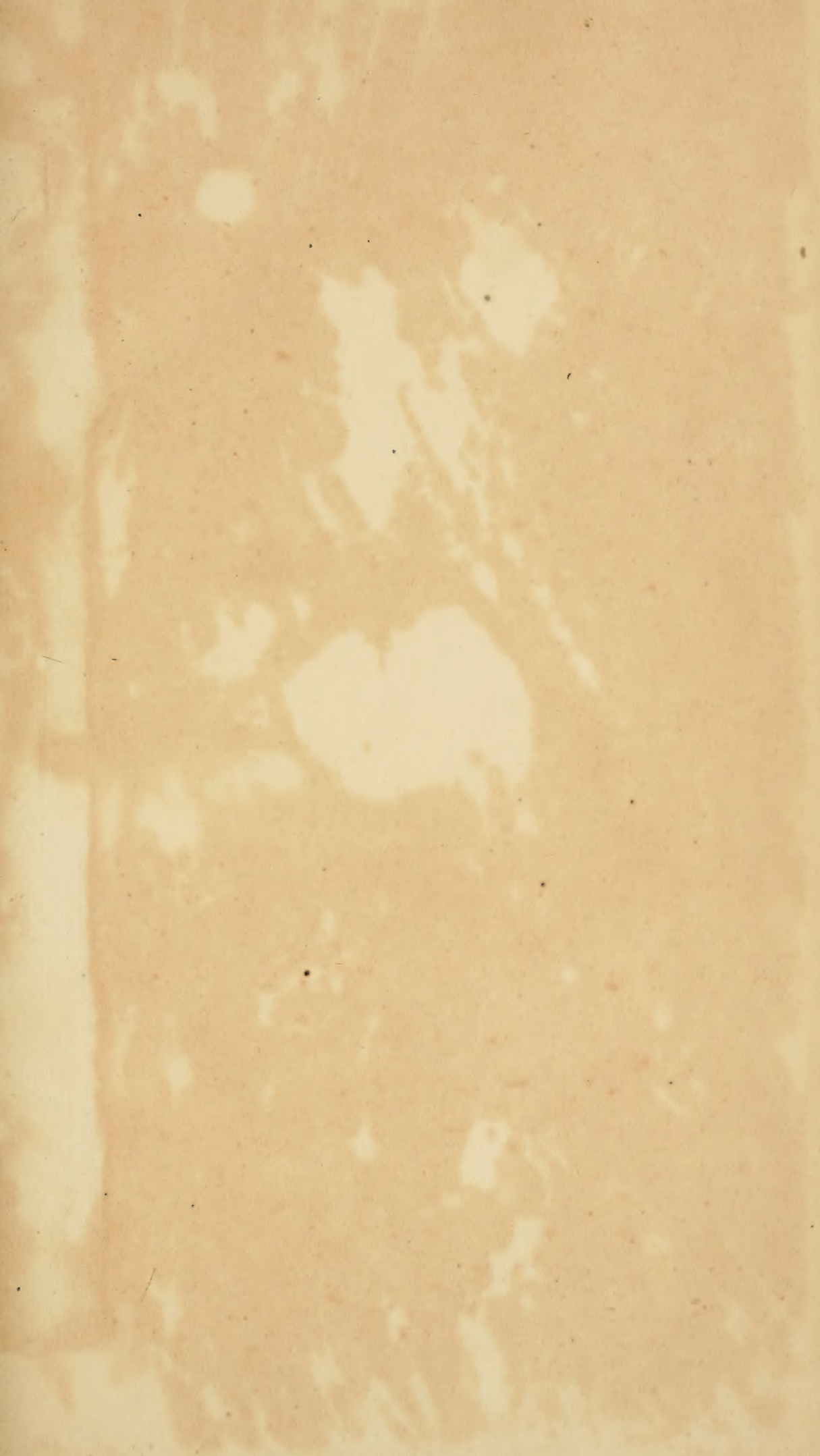






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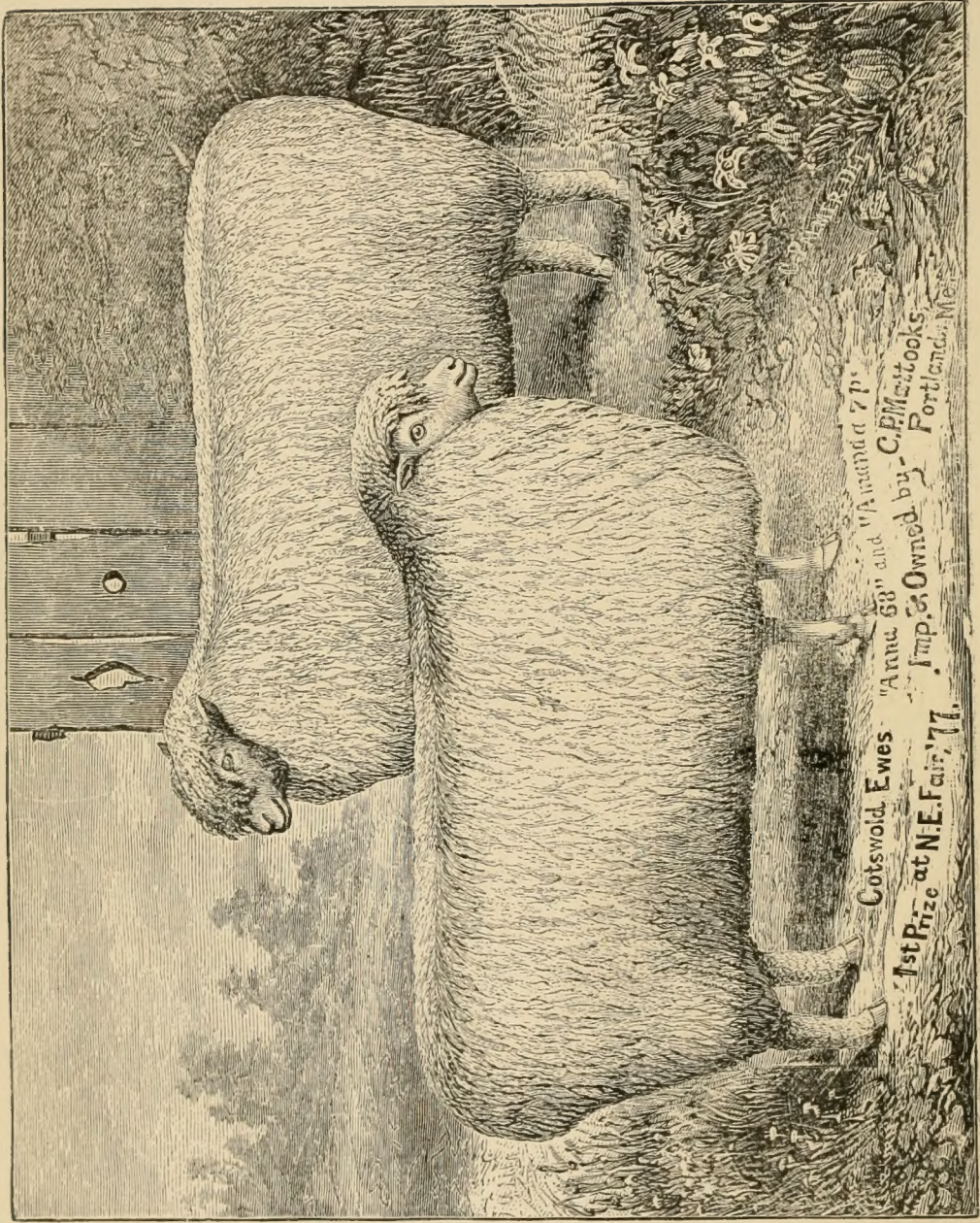












Cotswold Ewes "Anna 68" and "Amelia 71"  
1st Prize at N.E. Fair '77. Imp. & Owned by C.P.M. Stooks, Portland, Me.



# AGRICULTURE OF MAINE.



TWENTY-THIRD ANNUAL REPORT

OF THE

SECRETARY

OF THE

MAINE BOARD OF AGRICULTURE,

FOR THE YEAR

1878.

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# MAINE BOARD OF AGRICULTURE.

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 GEORGE FLINT, VICE PRESIDENT.  
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## MEMBERS AT LARGE APPOINTED BY THE GOVERNOR AND COUNCIL.

Name.	P. O. Address.	Term expires Dec. 31.
Henry Carmichael .....	Brunswick .....	1878
C. F. Allen .....	Orono .....	1879
George E. Brackett .....	Belfast .....	1879
D. M. Dunham .....	Bangor .....	1879
M. C. Fernald .....	Orono .....	1880

## MEMBER CHOSEN BY STATE AGRICULTURAL SOCIETY.

H. C. Burleigh .....	Fairfield Centre .....	1880
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## MEMBER CHOSEN BY STATE POMOLOGICAL SOCIETY. (Vacancy.)

## MEMBER CHOSEN BY MAINE POULTRY ASSOCIATION.

W. W. Harris .....	Portland .....	1878
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## MEMBER CHOSEN BY MAINE DAIRYMEN'S ASSOCIATION.

J. R. Nelson .....	Winthrop .....	1879
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## MEMBER CHOSEN BY STATE JERSEY CATTLE ASSOCIATION.

S. T. Floyd .....	Winthrop .....	1880
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## MEMBERS CHOSEN BY COUNTY SOCIETIES.

Horace Bodwell. . . . .	York .....	Acton .....	1878
Thomas Reynolds . . . . .	Oxford .....	Canton .....	1878
J. Marshall Brown. . . . .	Cumberland .....	Portland .....	1878
George Flint .....	Somerset .....	North Anson .....	1878
Isaac E. Mallett .....	Sagadahoc .....	Topsham .....	1878
Samuel Wasson .....	Hancock .....	East Surry .....	1879
John Thissell .....	Penobscot .....	East Corinth .....	1879
J. O. Keys .....	Franklin .....	North Jay .....	1879
H. L. Leland .....	Piscataquis .....	East Sangerville ..	1879
Nathaniel Alford .....	Knox .....	South Hope .....	1879
C. Hayford .....	Aroostook .....	Maysville Center ..	1879
S. Kilbreth .....	Kennebec .....	Manchester .....	1880
D. J. Briggs .....	Androscoggin .....	South Turner .....	1880
S. Kennedy .....	Lincoln .....	Whitefield .....	1880
A. R. Lincoln .....	Washington .....	Dennysville .....	1880
D. A. Wadlin .....	Waldo .....	Belfast .....	1880





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## INTRODUCTION.

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*To the Honorable Senate  
and House of Representatives:*

I have the honor, herewith, to transmit to the Legislature, in accordance with the requirements of the statute, the Twenty-Third Annual Report of the State Board of Agriculture for the year 1878.

In response to a cordial invitation from the people of Knox county, the annual meeting of the Board was held at Warren in that county, on the 19th, 20th and 21st of February, it having been the first instance of a meeting of the Board being held in the county. At that meeting, W. W. Harris, Esq. of Portland, was elected President, George Flint of North Anson, Vice President, and Samuel L. Boardman of Augusta, Secretary. Subsequently the usual committees of the Board were appointed, and at the opening of the public meetings an address of welcome, in behalf of the citizens of the town, was given by L. F. Starrett, Esq., of Warren, Clerk of Courts for Knox county. It was most appropriate to the occasion, and was responded to by the President of the Board and other gentlemen. The session was held in the Town Hall, and throughout the entire period it was well filled with a good audience of farmers and their ladies, the meetings continuing with increasing interest to their very close.

A selection from the papers presented and the discussions following them, is given in subsequent pages, it having been deemed advisable to condense the discussions somewhat and yet preserve all the essential points, and to omit, at the request of their authors, several lectures and papers presented. One of the most interesting and valuable lectures



given during the session, was that of Hon. W. J. Corthell, Superintendent of Common Schools, which was on the relations of the natural sciences to common school education, taking the form of a plea for their introduction into our system of education in preference to many studies which now find place there. At present, Mr. Corthell said, our common school work is performed too much on the cramming system. The pupils, instead of being taught to observe and investigate the works of nature, and to understand the practical matters of common life from a scientific stand-point, are simply taught to remember words about grammar, geography, and arithmetic—things which they do not comprehend—and to give them forth at the demand of the teacher. This memorizing and cramming is not education, though many falsely so call it. There is need that a reform should at once be made in this particular, and it can be made just as soon as the public sentiment of the people demands it. Children become tired and weary of the monotony of school life; and it must be so from the very nature of the case. The scholar cannot have his mind upon books about which he knows little, when his heart and soul are out among the birds and trees and flowers. In order to succeed he must have his soul in sympathy with work. Nature has vast charms for these young minds, and if they could be trained and directed in an intelligent study of her forces, the school-room would be no longer a prison, and we should see a more thoughtful, earnest, practical and observing class of scholars in our public schools. At this point in his lecture the speaker gave an interesting account of his visit to some of the schools in New Brunswick, where the scholars were put into communication with nature, and the good results of such a system. All about the school-room were boxes of plants, seeds were growing in glass jars so the process of germination could be observed, and little museums of stones, minerals, shells, insects, &c., were displayed about the room. The effect of a study of nature in this way, and of the collection of natural objects made by the pupils, was marvelous. They were very happy, close

observers of nature, and went to the study of their books with a fresher heart and new zeal. Something like this is wanted in all our lower grades of schools. No young man can be content with any kind of work that does not bring the intellect into play. His soul must be in his work. Nature has a peculiar charm to those who can read it as an open book. Tired minds, tired brains long for the relief that comes from communication with her forms. How is an interest in this to be brought about? No one takes a lively interest in any thing that he does not learn to love in early life. Children should be taught while still young to be close observers. A pebble has no charm to the careless observer, yet to the student of geology there is a written history in its uncouth surface. Our common schools should teach the natural sciences; and when the parents and those who have had enough of the dead study of books demand it, teachers will be found who will teach them, and then will be brought about the reform we so long to see completely inaugurated.

I have included in the body of the present report, as an independent paper, a lecture given during the annual meeting at Warren, on the Development of our Agriculture as a means for the improvement of business; and I would here acknowledge my indebtedness for many of the facts there given to a little work on the same subject, by Mr. Franklin W. Smith, published by J. R. Osgood & Co., Boston, and which the nature of the treatment I gave the subject, made it quite impossible to do in the lecture as spoken. Other authorities are cited and proper credit given in several places in the article itself.

Among the business topics considered by the Board at its annual meeting was that in relation to the disposition of that portion of the State Bounty to agricultural societies over which the Board exercises control, viz., one-half. After a full discussion of the same, it was decided that a part should be offered by the several county societies in premiums for the growing of wheat and corn, as being among the leading objects deserving of encouragement just at this time; and a



part expended for the holding of County Farmers' Conventions, the encouragement of the dairy industry, or for general farm improvements, the matter being left in the hands of the Trustees of the several societies to be expended by them in such manner as they should deem would best meet the demands of their several localities.

An invitation having been extended by the citizens of Presque Isle, Aroostook county, to hold the semi-annual meeting in that place, the Board voted to accept such invitation; and to hold the coming annual meeting at Orono, instead, as usual, of holding it in some other part of the State, in order to comply with the statute in giving the students of the college an opportunity to attend the lectures and discussions before the Board. Favorable arrangements having been made with the several railroad companies for reduced rates of fare, the meeting at Presque Isle gave opportunity for a large farmers' excursion to Aroostook county, which was taken advantage of by hundreds of farmers who had not done so before, of visiting that new and fertile portion of our State. The meetings of the Board were held in Johnston Hall, and the address of welcome was given by Edward Wiggin, Jr. of Maysville, formerly customs officer at Fort Kent, and now President of the North Aroostook Agricultural Society, responded to in appropriate terms by President Harris of the Board, and Rev. Dr. Allen of the State College. An extract from the address of Mr. Wiggin is here given:—

“The means of social, religious, and intellectual culture are by no means wanting in our midst. On hill-side and in valley, wherever even a straggling settlement has been made, you will see the humble school-house, the pride and hope of our people; while here and there, vieing in height with the lofty forest tree, which but a short time ago occupied its site, the white spire of the village church points trustingly heavenward, and shows that man is not unmindful of his God, or forgetful of his religious obligations. These remarks seem to be peculiarly appropriate to your meeting in this new county. In the older portions of the State, where your sessions are usually held, but little change comparatively is seen from year to year. The farms were made and finished before scarce a tree was cut in all this region. Here, large tracts of virgin forest are yearly being cut down, and brought under cultivation, and all these fine

farms and pleasant homes which you see around you have within a very few years been literally hewn out of the wilderness.

Nature has dealt generously with this region, and although we are subjected to some inconveniences, though our climate is somewhat stern, and our winters considered long and cold, yet, when we compare these drawbacks with many of the difficulties with which the farmers of the West have to contend, we cannot help thinking that Maine is the best place for Maine men, and that Aroostook holds out by far the best agricultural inducements to the surplus population of the older counties. While we are favored here with a rich and fertile soil, which in its natural state is capable of producing generously, which we have but "to tickle with the plow, and it will laugh with a harvest," we recognize the fact, that upon us rests the duty and responsibility of keeping it as nature gave it to us, and of transmitting it unexhausted to those who shall occupy it after we are peacefully reposing in its bosom. In order to do this, we know that we must make use of every means of advancement to a higher and more intelligent mode of cultivation; and we recognize as one of those means the sessions and discussions of this honorable Board, and the ideas which are disseminated from this source among the farmers of our county and State. And we are confident that much good will result to this section from the present session of this Board, in awakening our farmers to a sense of the need of more intelligent modes of culture, of a better knowledge of their soil, and its requirements, and of a higher and more generous system of cultivation than we have ever before practiced.

We hail it as one of the most encouraging signs of the times, that farmers are awakening to a sense of the need of a better special education for their calling, and that instead of the old hap-hazard method of farming practiced by too many, and which deserves not the name of cultivation, and which only served to prove that nature was so bountiful, and so lavish of her gifts as to furnish man with a subsistence in spite of his efforts to hinder her, is to be substituted a system of agriculture based upon sound and practical principles, intelligently and generously applied. Agricultural knowledge is being more generally diffused among the farmers of our State than ever before. Our Agricultural College, yet in its infancy, our State Board of Agriculture, true and faithful workers for the advancement and elevation of the farming class, our county and local societies, and last, but by no means least, our granges, established in nearly every farming community, are all so many educators of our people, and so many means of diffusing better and more advanced ideas relating to the farmer's calling. One of the most fatal errors of our system of education, heretofore, has been, in my humble opinion, that we have paid so little attention to the work of educating young men and young women *to do something*. Our classical institutions and higher universities are all right and proper, and I would be the last man to deny to any young man or woman the means of a classical education, of the very highest order that he or she is capable of receiving or appreciating. But it seems to me, that in our system of education we have made too much a specialty of fitting students



for the professions, and paid too little attention to the work of fitting youth for the actual duties of life; and the consequence is, that the professions are crowded to repletion; and though, as Daniel Webster well said, "there is always room higher up," yet there is but here and there one who is capable of reaching or filling those elevated positions, while we see all around us men educated in our highest institutions, men who have a diploma of some college in their pockets, who are utterly incapable of making a living for themselves, for the sole reason that they have never been taught *to do anything*. While this is the case, thousands of broad and fertile acres are lying tenantless, and awaiting cultivation, which are capable of affording ample subsistence to the many who are out of employment and unable to support themselves, too many of whom have been rendered so by this sad defect in our educational system.

This defect, gentlemen, we think, it is largely in your power to remedy. Not, of course, directly and immediately, but by your influence in helping to mould public opinion in this direction, and thus gradually to bring about the much needed change. And we rejoice that your Board is composed of men of large, generous and practical ideas upon these and kindred subjects, and we are assured that your labors are being attended with increased success, as the reports and discussions and papers brought forward at your sessions are more generally circulated and read by the people of the State."

At one of the business meetings of the Board during this session the members made their usual report on the crops in their respected counties, which are given herewith.

*Washington.* (Dr. A. R. Lincoln.) The hay crop was about two-thirds the usual yield, the absence of rain in May injuring the crop. Grain crops were excellent. A large amount of wheat was sown and the yield promises to be heavy. Potatoes rotted badly after being planted, (the seed) many being obliged to plant their fields the second time. The yield was good.

*Piscataquis.* (H. L. Leland.) The hay crop was one-fourth larger than the average, and secured in excellent condition. An increased acreage of wheat was sown throughout the county, the yield of early sown being good, but late sown was injured by the rust. The breadth of corn was increased over previous years, and the yield was above the average. Not as many potatoes were planted as usual, and the yield was lessened about one-half through the effects of rust. There was one of the largest apple crops ever known in the county.

Field and garden vegetables were good. Farm stock has increased largely over previous years, and the cheese factories in the county have had a successful season.

*Lincoln.* (S. Kennedy.) There was a third more wheat sown than last year, and the crop is good, averaging fifteen bushels per acre. Of barley less was sown than usual, and the yield was not up to the average. More corn was planted than usual and the crop more than an average. Not as many potatoes were planted as usual and the crop was poor.

*Penobscot.* (D. M. Dunham.) Apples and all fruits are abundant. The hay crop was above an average yield and secured in good order. A larger breadth of wheat was sown than usual, with a fully average yield; the few pieces of winter wheat that were sown did very well. The area of corn planted has more than doubled in the last two years, and the yield was very good. James M. Winchester of Bangor, has raised 83 bushels of shelled corn on one acre, and H. Doughty of Alton, 125 bushels of shelled corn from two acres. Barley, buckwheat and rye are not much sown; oats were an average crop. Potatoes were less planted than usual; the beetle did but little damage, but the potatoes rotted badly. Mangolds were a good yield.

*Oxford.* (T. Reynolds.) Corn one-third more than the average of the past five years. Wheat is the best it has been for years. The potato crop was light, not over half of last year's yield. Fruit the largest it has been for years, apples being smooth and free from worms. The hay crop was a good one—a quarter larger in yield than last year.

*Franklin.* (J. O. Keys.) Hay more than an average; the area of corn planted was one-fourth more than the average, with an average yield; wheat was a little less than an average in yield, but the breadth sown was a fourth more than usual; oats an average; of potatoes not half the usual acreage was planted, and the yield was not half the average. Neat stock in the county are increasing in numbers and in quality or value. Sheep are increasing, and horses growing



smaller in numbers. Apples are very plenty. Our cheese factories have not all run this year, but those that have, have made more cheese than ever. More cheese and butter has probably been made in the county this year than ever before in a single year.

*York.* (H. Bodwell.) Hay an average crop, and well secured. Wheat crop fair, and a larger one sown than in former years. Rye, barley, and oats, in many instances good, while the drought in some localities proved injurious. A larger area of corn was planted than for many years, and finer crops I never saw, many fields averaging from 100 to 200 bushels of ears to the acre. Potatoes were injured, both by the potato bug and dry weather, yet I think we have harvested enough for our own consumption. Apples in abundance and of the best quality. Pears and grapes were a light yield. Cattle are in a very good condition, and we have a larger surplus than last year.

*Androscoggin.* (D. J. Briggs.) The wheat crop is largely on the increase, both in acreage and yield; and corn is nearly double the amount of previous years. Barley has fallen off some in late years, and oats are about the same as usual. There was a light crop of potatoes the present year, as not as many were planted as formerly, and the crop rotted badly. Fruit of all kinds was very abundant. The hay crop was fully an average, and of very good quality. The yield of dairy products was fully up to former years. Farmers are keeping more sheep than formerly, especially of the mutton breeds, since people are finding them to be popular and healthful diet in meat. Oxen have increased in numbers, and cows are about the same as in former years.

*Knox.* (N. Alford.) Hay crop fair, and secured in good condition. More corn was planted in this county than ever before in a single year, and the yield is large. Statements made at the North Knox Fair, claimed that over one hundred bushels of shelled corn had been obtained per acre. Not as many potatoes planted as usual—and yield reduced one-half

by rot. The beetle was not very injurious to the crop. Rye good on burnt land. Spring wheat was more extensively sown than ever before, but the yield per acre was a little less than last year. Oats a light crop. We have but one cheese factory that was in operation this year, but it did a good business.

*Sagadahoc.* (I. E. Mallett.) The hay crop exceeds that of last year by one-eighth, and the quality is above the average of the past five years. Wheat was a quarter larger in acreage than last year, and the average yield about eighteen bushels per acre. Oats and barley not as much grown as formerly. Corn fully an average; potatoes a luxury, the crop being the lightest for years. Apples bounteous.

*Waldo.* (D. A. Wadlin.) Hay was an average yield, but was cut earlier than usual, and secured in better condition; wheat an increased acreage, with an average yield per acre; potatoes an average acreage, but badly damaged by rot; fruit excellent and abundant. Farm stock is increasing in numbers and are in good order and condition.

*Somerset.* (George Flint.) Hay, corn and wheat, very good, both in quantity and quality. Potatoes not up to an average yield, and rotted badly. More attention is given to beets and turnips than formerly, which is a sure indication of better farming. Fruits generally are very plenty. Hops have rusted, and have not generally been harvested. India wheat has proved good, and as it is valuable for fattening stock and poultry, I believe it worthy of more general cultivation.

*Kennebec.* (S. Kilbreth.) Hay crop medium in quantity, but its quality in advance of last year; corn excellent, more planted and more harvested than for some years past; wheat better than it has been known for years, and from one-fourth to one-third more harvested than generally; barley, medium; oats, light; potatoes nearly a failure; fruit very abundant. A considerable amount of roots for stock feeding were raised, and some farmers plant largely for this purpose.



*Hancock.* (S. Wasson.) Hay crop extra in bulk, but much injured in curing; potatoes rotted badly, but there was no injury from bugs; corn, good; wheat yielded at the rate of about twenty bushels per acre, and for the first time in many years we have grown our own flour; apples damaged by codling moth; cranberries a total failure; sugar beets a fair yield, and we grow them to advantage on marine manure. Farmers' clubs are in a prosperous condition, and we regard the "hard times" a blessing in disguise to cultivators of the soil.

No report was presented on the crops of Aroostook county, but from the observation of members of the Board, and the statements of farmers, it was clear that they were abundant, corn and apples excepted.

The papers presented at the Presque Isle meeting were arranged to have special reference to Aroostook resources, capabilities and needs, and as given in the body of the report will be found to have carried out their method quite satisfactorily. Commencing with the lecture of Dr. Allen on the means of retaining the fertility of the virgin soil, and following on through those papers relating to stock and crop husbandry and dairying, the several subjects treated, as will be seen, have direct bearing upon the peculiarities of Aroostook farming, and comprehend much sound information. Especially noticeable among these subjects was that relating to the sugar beet industry in this State, so well presented by Mr. Ernest Th. Gennert, which was made doubly interesting from the fact that at the time of the meeting at Presque Isle, the Dry House built by the Maine Beet Sugar Company for drying the sugar beets, to be transported from thence to the refinery of the company in Portland, was nearly ready to be started up, and was visited by the members of the Board and other farmers visiting the place, and examined with much satisfaction. At this meeting, by request, Prof. Farrington of the State College gave an account of the various agricultural experiments that have been carried on at the college

farm during the year, which appears in full in a subsequent page.

The meeting of the Board in Aroostook county, and the excursion thither of the Maine Press Association during the past autumn, has directed new attention to the advantages and resources of that section of the State as a farming region, and it is hoped that a new impetus to its settlement, and the advancement and improvement of its agriculture may date from these events. The geology, physical features, and present condition of the public or available lands in the county, are so well described by Dr. W. B. Lapham of Augusta, who was a member of the editorial excursion, in the articles from his pen relating to the same, that I make an extract from them which will prove of interest to all readers :

“Aroostook county contains one hundred and eighty townships, and has an area of nearly seven thousand square miles, or about one-fifth of the whole State. It is more than four times as large as the State of Rhode Island, a third larger than Connecticut, three-fourths as large as Vermont, four-fifths as large as New Hampshire, and nearly as large as Massachusetts. It is situated between forty-six and forty-seven degrees and thirty minutes of north latitude, being farther south than most of the State of Michigan, the northern part of Wisconsin and more than half the State of Minnesota. By the terms of the Webster-Ashburton treaty, the line between Aroostook county and the Dominion of Canada, known as the North Eastern Boundary, extends from the source of the St. Croix river, due north, until it strikes the St. John river at a point north of Hamlin plantation: thence along the middle of the river to the St. Francis river, thence along the centre of the St. Francis to the point where the southwest branch flows from St. Francis lake; thence southwesterly, with but one angle, to the southwesterly branch of the St. John. It is watered by the St. John and its tributaries, the principal of which are the Aroostook, the Madawaska and the Meduxnekeag. The general direction of all the rivers and their principal tributaries are eastward toward the St. John, the water-shed extending westward to the height of the land between that river and the Penobscot and its tributaries. There are few elevations that can be dignified by the name of mountains; Mars Hill near the eastern boundary, in the town of the same name, being the most important.

In regard to its geology, Aroostook county differs from all other parts of the State. In many respects it closely resembles portions of the State of Michigan and also of Canada West. One marked feature, which at once attracts the attention of the stranger from the central and western parts of the State, is the absence of boulders, and the almost entire absence of



cobble stones, pebbles, gravel, and other material usually denominated *drift*. One may travel for days without seeing a rock of any kind. The few rocks found in some localities, are generally calcareous, and the bed rock which underlies the whole county is either clay or calcareous slate, with occasional veins of trap. This bed rock or ledge is everywhere reached at from twenty to fifty feet below the surface, and rarely can wells be sunk so as to obtain water. The soil is a clay loam strongly impregnated with lime, and vegetable mould is found ten feet below the surface. For cereals, and in fact for almost any crop, no soil can have a better composition. The character of the rocky formation may be studied at Grand Falls, where the ledge is a mixture of slate and limestone, the strata having an anticlinal, the two sides dipping northwest and southwest. In the matter of building, the absence of rocks would be seriously felt, were it not for the giant cedar trees, which are everywhere mixed with the hard wood growth and which are used for fencing, for making bridges and culverts, and even for walling up cellars.

The general reader will have but little interest in a description of the smaller vegetation which helps to make up the flora of Aroostook county, but the composition of the forests is a matter of great importance to those who think of going there to live. The vegetation is very different in different parts of the county. The country bordering on both sides of the St. John, from Boundary branch at the northwestern part of the county, to Grand Falls, has the flora peculiar to northwestern localities in the same latitude, and is distinct from any other part of Maine. Here we find the *Astragalus Alpinus*, the *Oxytropis Uralensis*, the *Artemisia borealis*, the *Hedysarum boreale*, and numerous other Alpine plants, while the whole region through which they are distributed is covered with a heavy growth of cone-bearing trees, such as spruce, fir, hemlock and pine, this being the most valuable part of the county for lumbering purposes. South of this limit, not at once, but gradually, there is a marked change in the character of the smaller vegetation, while the cone-bearing forests give place to areas of hard wood, consisting of maple, beech and oak. We do not wish to be understood as saying that there are no timber lands south of the limit we have described, but that the hard wood growth predominates. Mixed in with the hard wood, almost everywhere may be found gigantic cedar trees, as large and as tall as the sugar maples, and growing by their side. These cedars are worked up into shingles and fencing material, besides being used as a substitute for stone, as already stated.

Formerly the entire county of Aroostook was the property of Maine and Massachusetts, but for one purpose and another these lands have been parted with, until there are now no public lands. Some of it has been sold at a very low price, for lumbering purposes; some has been granted to institutions of learning, and this, too, has fallen into the hands of the lumber kings; and in 1868 the Legislature foolishly granted nearly all the rest to aid in building a railway to St. John, which is very little if any benefit to the State. A railway to Houlton, Presque Isle and Caribou, through the heart of the county, would have remunerated the State for

the loss of its broad domain, but as it is, the conclusion is inevitable, that the land was fooled away. There was a condition attached to the grant of 200,000 acres of this land, that when the State should demand it, it should be lotted out and put into the market, at a price not exceeding one dollar per acre. These lands are now wanted for settlement, and the State cannot make the demand too quickly. Three million acres of Aroostook lands are in the hands of proprietors who are opposed to having them settled, and whose interests, therefore, antagonize those of the State. Several of the townships thus owned are worth much more for settlement than for lumbering purposes. We know of no way to bring them into the market except to tax them at their full value, which would soon bring the owners to terms. This we trust may be done.

Many Aroostook farmers are the owners of several hundred acres of land, much more than they can clear and cultivate. Frequently they have two or three hundred acres of forest growth. These large tracts will eventually be divided up into smaller farms and sold to settlers, and such instances are not uncommon now. Then again, strange as it may seem in a country like this, land can always be bought with more or less improvements, at a fair price. On the first two tiers of townships, are more or less settlers who, until the boundary line was settled, supposed they were in New Brunswick. They are frequently unthrifty and discontented, and embrace the first opportunity to sell out and go among their own people. Then, scattered all over the county, are settlers whose property is mortgaged and who become discouraged and sell out their improvements and go somewhere and begin again. So that persons who have had even small means have always been able to go to Aroostook and buy out claims at better advantage than they could go into the wilderness and start anew. It will be noticed that in these communications there has been much sameness in speaking of the different places we visited; nor could a truthful description make it otherwise, for the reason that the land is much the same throughout the county. The value of a particular location over another has much more to do with its nearness to market and easier communication with the outside than with any superiority of soil, for in this respect there is little to choose, and we hesitate not to say that the county of Aroostook is the richest and best agricultural region in New England."

During the past two or three years I have had very frequent occasion to see the need of a brief compilation of the laws of our State relating to agriculture, or of special interest to farmers. Officers of agricultural societies and those interested in them, have repeatedly written me asking the provisions of the statute in certain cases; while from out of the State I have had frequent requests for the laws governing our Board of Agriculture, Agricultural Societies, State Agri-



cultural College, and our statute provisions concerning other matters of agricultural interest. To meet this demand, I have presented in the accompanying report a compilation of the agricultural laws of the State, having carefully examined the Revised Statutes of 1871, and the volumes of the Public Acts and Resolves from 1871 to 1878 for this purpose, giving such statutes and parts of statutes as seemed to come within the plan aimed at. I trust the same will be found of service to all farmers, and especially to those connected with our various agricultural organizations.

There is a provision of the statute for making returns of the agricultural productions of towns, cities and plantations, by the assessors thereof, the full text of which will be found on pages 242-243 of the present report, which seems to have been a sort of dead letter ever since its enactment. It appears to have been incorporated into the Revised Statutes of 1871 from the laws of 1860 and 1862, and by a clerical or typographical error the word "wheat" was omitted from the statute in the course of revision. Consequently, when the blanks to be sent out by the Secretary of State, as therein provided, were printed, they were printed with this omission, which in some instances was supplied by the municipal officers in making their returns. The returns of these statements, or of the blanks as filled out by officers of towns, have been made with great irregularity—there being no penalty attached to non-fulfillment of the provisions of the law—but such as have been received, show how valuable such reports could be made was a report for every town received, and could the results thereof be put in some permanent and accessible form for use and reference. Up to the date of sending this report to press there have been received at the office of the Secretary of State in 1878, two hundred and sixty returns, or from about one-half the towns in the State. As these returns are for "the use of the Secretary of the Board of Agriculture," I beg to suggest that some measures be taken to render the law more effective, or that it be abolished entirely. No value whatever can be attached to such returns from half the State

only, but if a report could be received from all the towns, and be received in season to be available for the agricultural report of the following year, great benefits might come from it. The amendments I would suggest in the present law are, that all returns should be forwarded to the Secretary of State on or before July 1, of each year, and that unless such returns were so made, a penalty be inflicted upon delinquent officers that would insure the carrying out of its provisions.

The year has witnessed the successful starting of the factory of the Maine Beet Sugar Company at Portland, and the building of its dry-house for drying the sugar beets, at Presque Isle. The factory started October 21, and turned out 94,000 lbs. of standard granulated sugar, made from beets grown in Maine. The factory was in operation about fifteen days, working from seventy to one hundred tons a day. Had sufficient beets been grown to have kept the factory at work one hundred days instead of fifteen—it would have been a positive success. It is a success even now up to this one point; the machinery necessary for making beet sugar has been fitted up by the Company at a cost of some \$15,000; they have demonstrated that sugar can be made from beets grown in Maine. Will the farmers of the State now aid the enterprise by growing beets enough the coming season to keep the factory in operation one hundred days? If so, the success of the enterprise is not problematical or doubtful, but is assured. It will depend entirely upon the growing of sufficient beets—this is all. The results of the present year, under the most unfavorable circumstances, show that farmers can realize from \$80 to \$120 per acre, cash, for the crop, or more than the average obtained from corn grown for canning purposes. One matter that has not yet come into the discussion of this subject is that of the disposition of the pulp. This is a most valuable feeding stuff for cows, horses, hogs or sheep—more valuable in fact than the beets themselves, because it is cut ready to be fed with hay or straw in the form of chopped feed; it has parted with most of its water, and the same weight is four times richer in nitrogenous



material than the beets themselves. What our farmers need is this pulp for feeding to their farm animals. Should farmers in our State be willing to grow beets another season sufficient to warrant the expenditure, the Company will at once proceed to build six or eight sugar houses for producing raw sugar from the beets, in various parts of Maine, so that farmers can be within easy reach of transportation to a factory, and can also haul back to their farms the pulp made from the evaporation of the beets into crude sugar. This raw sugar can then be transported to the refinery of the Company in Portland to be manufactured into the standard article.

Learning that the pulp was this fall shipped to several prominent farmers in different parts of the State, I addressed letters of inquiry to each one of them, asking for their results in feeding it. I have not room for all these replies, but give that of W. W. Harris, Esq., of Portland, a member of the State Board of Agriculture, and will only remark, that all the others speak in highly favorable terms of their use of it in its fresh state, before fermentation has taken place. This, as Mr. Harris observes, can best be obviated by keeping it in pits or air-tight compartments in the barn cellar, and feeding out as wanted during the winter season. Mr. Harris writes :

“In reply to your inquiries have to say, I had a car load of ‘Beet Pulp.’ Press of fall work drove me to make the shortest or quickest disposition of it, and I spread on my barn floor, shoveling over every day. In this way I kept it for some time in good condition, and my cows enjoyed it and ate it with a good relish; but after awhile it became somewhat sour, and of course unfit for them. My store pigs have lived on it entirely. I scald it and mix a very little corn and oat meal with it and think it a good feed for them; at any rate, they are growing finely. From my experience with this first trial I think well of it, and will be sure to have better facilities for storage next time. If kept from the air it can be kept in good condition any length of time. This may be done, ‘pitting’ in the ground or in an air-tight compartment in the barn cellar or otherwise. Should the beet sugar business succeed, as I trust it may, the beet pulp will be regarded of sufficient importance to make provision for its storage. There is no doubt that it is a valuable feed for cattle and pigs.”

Good returns have rewarded the labor of the farmer, and the season has yielded the most abundant and satisfactory returns. Crops of all kinds have been heavy—with the single

exception of potatoes—and greater yields of wheat and corn have been obtained than in a single year for the last decade. The agricultural exhibitions were well attended the present fall, and their results clearly indicate greater interest in agricultural development and methods than has been witnessed for years. The returns from these societies will appear, as heretofore, in the second part of this report. The cheese factories have passed a prosperous and satisfactory season.

At the State College of Agriculture and the Mechanic Arts, the most noticeable event has been the inauguration of the system of workshop instruction in the mechanic arts, as contemplated in the original establishment of the institution. The vise shop was put in operation May 4, under the instruction of Mr. Valentine Walburg of Boston, and the forge shop, work upon the building of which was done almost wholly by the students, was opened October 1, being under the immediate oversight of Prof. W. A. Pike of the College. The classes taking the course in vise and forge work, have made most remarkable progress; and the shops have been started wholly by funds obtained by private subscriptions, the chief donor having been Ex-Gov. Coburn of the Board of Trustees.

The illustrations to the present report were furnished by Gen. Charles P. Mattocks of Portland, one of the most enterprising and extensive breeders in the State. The frontispiece is a portrait of Anna, 68, A. C. R., and Amanda, 71, A. C. R., a pair of imported Cotswold ewes, bred by Robert Garne of Aldsworth, Northleach, England, which won the first prize at the New England Fair of 1877. Facing page 142 is a portrait of the imported Cotswold buck, Lord Benson, 7, A. C. R., dropped in 1875, weighing 356 lbs., and bred by Russell Swanwick, Royal Agricultural Farm, Cirencester, England. Lord Benson was the receiver of a first prize at the U. S. Centennial Exhibition at Philadelphia, in 1876. At page 208 are portraits of Organization, 1603, A. B. R., and Coxwell Fancy, 3870, A. B. R., two Berkshire swine; the first bred by Heber Humfrey of Shrivenham, Berkshire.



England, and the second by Mr. Gerring of the same place. These animals were imported and are owned by Gen. Mattocks.

Among the papers presented at the meeting of the Board, at Presque Isle, not given in the body of the report, was one containing a review of the past ten years of the Board, by Mr. Brackett, one of the Members at Large, and who has occupied a seat during this period, from which the following extracts are made :

“The system of meetings of the Board has been radically changed during the past ten years, and the change, unlike many others, has been an improvement. Our sessions are now held semi-annually instead of annually, and at different sections of the State instead of at one place, so that whatever advantages may be derived from them, all portions of the State are equally favored. Their character has also been modified, improved and enlarged, and, like this session, they partake of the plan of a farmers’ convention more than of a formal body, and all interested are cordially invited to participate in the meeting and discussions. I acknowledge, at first I was not favorably inclined to the plan of ‘putting the Board on wheels,’ as the change was termed by one of our facetiously-inclined members, but experience has made me its advocate, and entirely satisfied. This plan carried the meeting to Fryeburg a year ago, to Calais not long since, and brought us here to-day, thus traversing the extremes of our noble State and giving all sections and all farmers and persons interested an opportunity to participate in the proceedings—to give and receive, and to obtain the benefits and advantages if there are any accruing from the sessions. I think the wisdom of the change has been fully established.

Another notable change for the better, which has occurred during the past ten years, is the addition of the scientific members from the colleges to the Board, thus adding an element of strength and interest hitherto wanting, in a large degree, and uniting learning and experience and theory and practice in one body. A direct connection has also been effected between the State College of Agriculture and the Board, by which we see members of its faculty and its students with us taking part in the exercises of the session. In fact, the College of Agriculture and Mechanic Arts has been one of the growths of the past ten years. The long and somewhat fierce struggle which resulted in establishing it a separate institution and thus giving it a chance and right to be something, and made it what it is, is still fresh in our minds, and I am glad to remember the Board took the right view of the matter and spoke with no uncertain sound. The farmers and mechanics of Maine should congratulate themselves that their college has been fairly inaugurated under such adverse circumstances, and that it is, so far, so well meeting and sustaining the hopes and expectations of those who have labored in its behalf.

During these ten years the Board has discussed and dealt with a large number and variety of subjects pertaining to agricultural practice and

economy, and among the bushels of chaff gathered, there have been many grains of gold—essays and papers, discussions and recommendations, practices and precepts, which have been worthy of any State or institution, and of specific interest and value to our citizens and the community. It is useless to attempt to enumerate the subjects of special importance which from time to time have occupied the attention of the Board, for time and space would fail even if memory would allow. There is no section of the State, where our sessions have been held, but that seemed to require that some specific subject adapted perhaps to its special needs should be discussed and dwelt upon, and the Board has never failed to do its duty in the premises. Thus for Aroostook it may have been stock-raising and dairying, for Somerset, sheep husbandry, for Androscoggin, fruit-growing—for one place the hay crop, for another root-culture, &c., &c., as may have appeared to be best adapted to or required in the community, and in every case we have done our duty by acting according to the light that was in us.

The power of saying how a certain portion of the State stipend paid annually to county agricultural societies, should be spent, having been delegated to the Board, special attention for a term of years has been given to the subject and the objects for which these special premiums have been offered have been such as to promote the best interests of agriculture, both specifically and generally. Among these objects were:—Farmers' Clubs, Underdraining, Native Apple Nurseries, Thoroughbred Stock, Wheat Growing, Agricultural Libraries, &c., and the result of the specific premiums, especially those running through a term of years, has been entirely satisfactory. We need have no hesitation in saying for example, that the stimulus given to wheat raising in Maine, by the premiums offered by agricultural societies under directions from the Board, have resulted in the increased amount sown and grown for several years and especially the excellent crop this year, which will keep enough money at home, that otherwise would have been sent out of the State for bread, to pay the expenses of this body for half a century.

In this connection I regret to say that the character of the annual exhibitions of our county societies has failed to keep pace with improvements made in other departments of agriculture. With a few most worthy exceptions they have lately been comparative failures. The term 'agricultural horse trot,' formerly applied to them in jest, has become too true in too many cases. I am glad to say the Board has generally been on the right side in regard to the tendency to make our Fairs simply horse races, but I feel we have not spoken loud enough or with sufficient earnestness. I think I can perceive a growing tendency among our best farmers in opposition to horse racing and its necessary vicious concomitants at our Fairs, both State and county, and I hope to see the time when it shall be entirely disconnected from them.

Not only has the range of subjects treated by the Board been wide and varied as is our State, but not a few new, and at first thought seemingly original and apparently startling theories and propositions have been



presented. I well remember but a few years ago when one of the members presented the subject of 'Fish as food for Stock,' having particular reference to feeding herring or porgy chum or pomace to sheep, and sustained his position in its favor by well taken facts, reasons and arguments. The effect upon the members and hearers was remarkable. Many accepted it as a joke, some pooh poohed, or treated it with contempt, while the greater number let it go by default. But the subject has been studied and looked into and experimented with, and the original position sustained, for the Superintendent of the College farm tells us that repeated experiments under his own observation proves the fish to be almost if not quite equal in value to Indian corn for food for sheep.

Prominent among the subjects discussed during the later years, has been specialty farming, which has been the means of eliciting much information and many arguments pro and con. As a result, and growing directly out of these discussions, we have our associated dairying system, the manufacture of cheese by the factory method, which I consider one of the best agricultural departures ever made in our State. I have faith in it, and believe it is yet to be a leading, paying, and controlling interest in farming in Maine. We are now down to "hard pan," in factory cheese making. The experience of the past two years was not satisfactory to many patrons of the factories, and the milk receipts this year have been much less than at first. There were several good reasons for these results, not the least of which were inexperience and hard times. In my section of the State a portion of the factories have been in operation the past season, receiving a reduced amount of milk, and being worked on a more economical system.

The indications for this year's results are favorable. The stock of cheese has been largely marketed at comparatively paying prices, seven to ten cents per pound, which is high, considering the price of milk and butter. And still, the great, underlying argument in favor of associated dairying—the gradual but sure improvement of our soils and farms—holds as true as ever. The experiment has been well begun in Maine, though attended by adverse circumstances, and I trust it will be continued through a series of years, until better and larger herds of cows, renovated and enriched fields and farms, and those other attendant advantages which always accrue to a person or community which produces and sells a manufactured or condensed article rather than the raw material, shall attest the value and wisdom of practicing associated dairying in the old Pine Tree State.

During the decade the Secretary, who is really the head, front, and exponent of the Board, has been once changed. There have been but three Secretaries since the organization, a period of twenty-five years. Our annual reports, made up of the papers and discussions of the Board, reports of societies, &c., and issued under the supervision of the Secretary, compare favorably with those of any State in the Union. The volumes for the twenty-five years comprise in themselves a valuable agricultural library, adapted to the needs of the farmers of our State. They are in

great demand by our farmers, and my small apportionment is but a drop in the bucket of demand, in my section.

Of course, the Board has not maintained an existence twenty-five years without meeting opposition. Hardly a session of the Legislature passes but some public spirited member, hailing somewhere from Quoddy to Madawaska, upon whom the mantle of "reform" has fallen, in his own estimation, attacks the Board as a "useless institution," a "leech upon the treasury," and many such endearing epithets. Think of it, you bloated office holders—you members of the Board who work for nothing and board round. Don't your consciences smite you for your extravagance? But, so far it has withstood all such uncalled for attacks, and has gained friends, and been strengthened by the opposition and clamor for a mistaken economy. I presume the same old cry will come up again next winter, led on by some ignorant, self-constituted guardian of the State treasury.

But the greatest change has taken place in the composition of the Board itself. I look around me to-day and find but one present who was a member ten years ago, and there are but two of us on the rolls. Three generations of members, as it were, have come and gone, have been elected by their several societies, served a three years' term, have done their work and given place to others, and some of them have left vacancies which can never be filled. Of the influence which the Board in its labors has exercised upon the community, and of its value to the agricultural interests of Maine, it is not for me to say, it must speak for itself; but I think I can truthfully say, its record will compare favorably with that of any other body or society in the State, and I trust and have no doubt another decade will find it still more worthy of support, and a still greater and more powerful agent in forwarding that great interest, agriculture, which underlies and is the foundation of all material and national prosperity."

A review of the industrial history of Maine will show that agriculture has ever been its leading productive interest. This must continue to be such for generations to come, and on its development and improvement in the future will depend the prosperity of all classes of its citizens, and through them that of the State. We have in Maine—census of 1870—208,225 persons engaged in the various occupations in life. Of the whole number having employment, 28,115 were engaged in trade and transportation; 36,092 in professional effort; 62,007 in manufactures and mining, and 82,011 in agriculture. Thus thirty-nine per cent. of laboring persons in our State are devoted to the productive and creating employment of agriculture. For the farmer creates products that before had no existence, and at the same time increases



his power to produce more largely in the future by the improvement of the soil. Every bushel of wheat, corn, or other grain; every pound of wool, mutton or beef, produced on the farm, is so much added outright to the wealth of the State; and every dollar added to the value of an acre of land by the skill of the farmer, increases the income of the State one-half of one per cent. in the form of taxes. In short, it may be said that agriculture is the only source of primary creative production; for agriculture not only *creates* products, and, therefore, values, but if intelligently and skilfully carried on its productive capacity is increased even during the exercise of its creative power—something which cannot be said of any other productive industry, for while the practice of the mechanic arts and mining enhance the value of products, they cannot create them. If skill and persistency are employed in working a quarry, the sooner its value is exhausted; if a machine is run with greater intensity its productive capacity is impaired. Taken in its broadest sense, agriculture feeds and clothes the world, and yet its productive power is constantly increasing. In the apt words of Mr. Thomas P. Janes, the distinguished Commissioner of Agriculture for the State of Georgia, in his Report for the present year: the handmaids of agriculture, "science and mechanics, are yearly becoming more subservient to its commands. Civilized States are recognizing its importance to man, and realizing the necessity of extending the fostering care of their organized power to its advancement and development. Recognizing it as the fundamental source of their wealth, and that upon the knowledge and skill of its votaries depend the increase of its productive power, departments, schools, colleges and experimental stations have been established for its encouragement. Under such fostering care it is no longer regarded as an art controlled by mere empiricism, but has taken its proper status in the estimation of men and nations *as a science*, to which other branches of science are made tributary. Geology, botany, meteorology, physiology, chemistry, mechanics, zoölogy, entomology—all the natural sciences which existed

as such while agriculture was looked down upon as a mere art, are now proud to make their contributions to the *science* of agriculture. As a mere art, agriculture was exhaustive of her own resources; as an applied science, she builds up her waste places, and while yielding annual profits, constantly increases her producing capacity. The suspension of agricultural production for a single year would stop the wheels of factories, suspend every branch of business, and depopulate the earth by famine."

Assuming, then, as it is abundantly prudent to do, that agriculture is the primary source of the production of wealth, and that upon which other industries in our State depend for their very existence, it becomes our people to consider what can be done by individuals to increase the productive power of our agriculture; what may be done by organization which cannot be performed by individuals, and what can and should be done by the State, or in other words by the political organization of citizens, which is not done by either of the first named agencies.

It is the duty of individuals engaged in agriculture to employ knowledge and skill in their business, to carry on a profitable and successful agriculture rather than a wasteful system, and to employ the aid of science to such an extent that the method of farming pursued may be a restorative rather than an exhaustive one, and by culture and cropping even, bringing the soil into a more productive condition. The farmer must read, study, think, keep abreast with the progress of science in his calling, use knowledge and education, and avail himself of the teachings of science, and of the practice of the most successful and wisest agriculturists of the times.

Organizations of farmers may do much for agricultural development and progress that cannot be carried forward by individual effort alone; co-operation and association bring results for good when employed in a good cause. Agricultural societies, the Board of Agriculture, farmers' clubs and



granges, local associations and farmers' conventions, discussions and institutes—are all efficient agencies for promoting that art and science which is the grandest creative art in the universe, and upon the advancement of which all the material interests of the State depend.

The State, in one sense, may be regarded as an organization of citizens for mutual benefit, supported by taxes which are self-imposed. The taxes are paid by the people who own the property and are the creators of the wealth upon which the amount realized from taxation depends, for the support of the political organization known as the State. It is therefore thoroughly competent for the people to say, through their servants the representatives, that a portion of the income of the State shall be devoted to increasing the productive capacity of the same. How can this be done? By encouraging the obtaining of that knowledge and skill needed in the prosecution of the business of farming, in individual producers, by the support of the State College of Agriculture and the Mechanic Arts for young men, the Board of Agriculture for adults, and all those agencies which are educators of the farmers at large; and by carrying on experiments, as is being done at the State College farm at Orono, which are both illustrative and investigative, which demand skill and knowledge, and the employment of means and appliances which cannot be commanded by individuals.

Nothing can be plainer than that all classes of citizens, regardless of party, are either closely or remotely interested in the prosperity of the productive industries of the State, and that measures which aid these are not amenable to the charge of class legislation, but are in fact for the general and common good. When the agriculture of Maine prospers, everybody rejoices; when it suffers, those engaged in all other occupations, however remotely connected, feel a corresponding depression. In view of these facts, it belongs to the State to look to its own advancement and prosperity through the increased knowledge and skill of its producers,

and the results which a development of its agricultural resources is sure to accomplish. A wise and judicious statesmanship will foster the sources from which the material and financial life-blood of the commonwealth is obtained.

Respectfully submitted.

SAMUEL L. BOARDMAN, *Secretary*.

OFFICE OF MAINE BOARD OF AGRICULTURE, }  
*Augusta*, Dec. 31, 1878. }





# MAINE BOARD OF AGRICULTURE.

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## PAPERS AND DISCUSSIONS

AT THE ANNUAL MEETING AT

WARREN, FEB. 19th, 20th and 21st, 1878.

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### THE GRASSES OF MAINE.

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BY SAMUEL WASSON, EAST SURRY.

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Grass, an herb with long, narrow leaves, is the common herbage of the field, on which cattle feed. As its properties are unlike, it is variously grouped, the classifications being scientific, artificial, superficial and whimsical—the whimsical, being the one in use in common every-day life, and which calls everything a grass, is like calling every creeping thing an insect because it creeps.

A popular and convenient classification arranges them in five groups, as—Jungle or Bush, Aquatic or Water, Marine or Seaside, Meadow or Upland, Agrarian or Fallow.

The classification for the purpose of this paper, is founded upon use alone, disregarding all the features of the plant, excepting in the relation of friend or foe.

The *Gramineæ*, or Grass Family, the most important in the vegetable kingdom, is a vast family of plants, comprising 300



genera, embracing 4,000 species, to which yearly discoveries are constantly adding. As "nothing was made in vain," then, of this numerous family, distributed throughout the whole world, each was made for a purpose, and has a place to fill in creation's plan.

The dividing line between a grass and a weed, is a "devious path where fancy leads," for many of the so-called weeds are real grasses, or friends in disguise, and many of the true grasses are *defacto* weeds, or enemies to be avoided. Barn grass (*Panicum crus galli*), and Witch-grass (*Triticum repens*) become grasses or weeds, just as their room is or is not "better than their company." They fill the place in the play of "now you see it, and now you don't."

Of the friendly forage grasses, of which there are hundreds, most farmers cultivate only the friendship of herds-grass, red-top and clover. A few add orchard grass and brown-top, and occasionally one, shaping a course by something more tangible than ancestral "say-so's," adds twelve, or twenty, to his retinue of grass friends.

Such of our agricultural book makers as have not stepped out into the field of truth and common sense, recommend only six sorts as the full complement of friendly grasses which can rightfully claim a natural superiority; when acres of observation are covered with facts which have grown up in spite of the old dead-stuff of the past, showing that neither six nor ten times six, reach the highest number of grasses of natural pre-eminence.

Herds-grass, red-top and clover, are the creations of man; their superior merits are due to the loving kindness of culture, while the ugliness of many a grass, driven into exile as a weed, is chargeable to neglect.

The symmetrical form and beauty of our thoroughbreds, the luscious and health-giving fruits, the cereal grains, and thousands of the beautiful flowers,

"That consecrate this fallen world of ours,"

are not found in nature, their excellencies have been evolved by the vigilance of man.

## THE PLAN OF STRUCTURE OF THE GRASSES.

Every plant is a living witness of a creative plan. Examine a grass plant, and the plan of its structure is seen to be fixed by a simple mathematical law, which applies to every part, the root, the stem, the leaf, the flower, the seed. Each is constructed and arranged by that same law, and by it is fixed the form and shape and the precise place each is to occupy. The leaves, lance-like, alternate, and two-ranked, always; while those of a true weed are in three ranks, an apple in five, a plantain in eight, and so on in the same numerical progression.

Measure the distance around the stem of a grass, or the stalk of a weed, or the trunk of a tree, and the circumference of each, describes a circle that every school-boy knows is divided into 360 equal parts, however large or however small the circle may be. With a grass measuring around the stem from the first leaf at precisely 180 spaces, is the point of attachment of the second leaf, and at 180 spaces more is the third leaf, which is vertically over the first leaf. With a true weed the second leaf is one-third of the way around, or 120 spaces from each other, so that the fourth leaf is over the first; with a plantain the second leaf is one-eighth the way around, or at 45 spaces, bringing the ninth leaf over the first. Of the tens of thousands of plants, the true grasses have their leaves at the greatest possible divergence, or half on one side of the stem and the rest on the other side.

The stalk of a grass has joints; the stalk of a weed has none. (The "Wandering Jew," a cryptogamous or flowerless plant, is jointed.) A grass has as many leaves as it has joints, and the leaf can be taken off without splitting or tearing it, excepting where it is fastened at the joint. Plants, not grasses, are covered or surrounded by an epidermis or skin, which tears or splits in taking off, like the bark from a cedar tree.

With many of the different grasses, the resemblance is so very close that botanists only can tell "which is which." Botanists say that red-top and Rhode Island bent are identical. Practical men say they are not, and no theory can dispute an



inch of ground with practice. Cattle tell when a grass is friendly. A grass may be rich in nutritive matter and animals refuse to eat it. A forage plant, known as *Ulex Europaeus*, which will increase the flow of milk and gives a good flavor to butter, is armed with sharp barbs,

“Every blossom has a troop of swords  
Drawn to defend it.”

Analysis often finds a plant to be wanting in nutritive matter which is peculiarly palatable to cattle. Bermuda grass (*Cynodon dactylon*), ranked as worthless, and for years looked upon as a curse, when properly cured, in Southern markets is worth \$30 a ton for horses.

*General Characteristics.*—Unlike most of the other families of plants, the grasses are restricted to no belts of latitude; nor are they bounded by any climatic range, but in every country, clime and soil, spring up to dress the earth in living green. The law of arrest in geographical expansion they do not respect.

Although the grasses possess or acquire a capacity to grow under a wide range of climatic variations, only where there are occasional snows do they ever form a true turf or sod. A real grass turf rarely occurs south of Washington, or below the drift range. It is the rich, green grass carpet of Ireland, which makes it the *Emerald Isle*. It is the velvety sod of Switzerland, with its “green things” growing, which named her mountains the Alps.

The bamboo and kangaroo grasses of tropical climates, do not form a turf, but grow singly or in groups or tufts. At Old Orchard Beach, in our own State, a species of tussac grass grows, in the drifting sand, as far as it is bathed with the spray of the sea. This genus, the “gold and glory” of the Falkland Islands, contains two species, *Carex trifida*, which is an inferior grass, and *Festuca flabellata*, which will make cattle thrive. Both will grow from root-slips.

In Maine there are 125 known species of grass, which, under the influence of culture and climate, may sub-divide into a thousand varieties. In New Hampshire, 18 families or

90 species are known. In Massachusetts, 130. In Illinois, 105 native species. In Nebraska, 143. There is not a shadow of doubt that a Natural History or Geological Survey of Maine would discover 75 new species of native grasses.

Of the 125 known species in Maine, not more than 30 have been tamed and found to be friendly, and not over 50 are known to be of any agricultural value; and even of the 30, not one farmer in a thousand can correctly name a "baker's dozen" of them.

The grasses belong to the family of flowering plants, and is one of the sixteen natural groups of plants, cultivated to supply man and his domestic animals. While they number from 4,000 to 6,000 species, and from their "centres of creation" have been distributed over the surface of the earth, not one of them is remarkable for brilliant, aromatic, or showy flowers; yet, these often play an important part in determining the species, as well as the sex of the grasses. The flowers are generally perfect or monœcious—that is, in one house—the essential or fertilizing organs being in the same flower or blossom, or in different blossoms on the same plant. Buffalo grass (*Buchloe dactyloides*) is the only known species in which the staminate or sterile, (male) and the pistilate or fertile (female) flower grow on distinct plants, as they do in the willow. It is worthy of note, that the morphology of the flowers of the natural grasses, is quite distinct from that of any other plant, and while the blossoms are neither large nor showy,

"Not one of Flora's brilliant race  
A form more perfect can display,  
Art could not feign more simple grace,  
Nor nature take a line away."

The natural grasses belong (when the name is taken from the stem) to a class known as *endogens* or "inside growers." The growth from the inside pushes outward; there is no distinct bark and no layers or wood rings, but the threads of wood are scattered throughout the stem or spire, without any particular order. When the name is taken from the leaf



the grasses are called *monocotyledonous*, an inconveniently long word of Greek derivation, to express the fact of their having but one seed-leaf. The clovers, which are not true grasses, are known as *exogens* or "outside growers," or as *dicotyledonous* or "two-leaf plants." With the *exogens*, each year's growth forms a ring, so that be it a clover or a cedar, it exhibits as many concentric rings as it is years old.

The most of the grasses are hollow; a few have the hollow filled with pith like a corn stalk. When herds-grass is grown on muscle bed, the pith becomes quite solid in the stem.

#### IMPORTANCE OF GRASS.

When Cato was asked what was the best system of farming, he thrice answered, "to graze well"—to procure food for cattle. The force of Cato's answer is seen, in that the grass crop is one of the three great crops of the country, and that more land is devoted to its cultivation than to any other product. Its importance, nothing in the "language I have lived in," can express. The "grass faileth;" what a symbol of desolation! What a synonym of famine! Considered in a utilitarian point of view, and the grass plant has a stronger claim on the farmers of Maine, than any other product of her soil.

The "Official Crop Estimates" show that Maine's acreage in hay is nearly three times the combined acreage in corn, wheat, rye, oats, barley, buckwheat and potatoes, and at \$11 per ton, is of twice the cash value of all the other products. Computing the pasture area at double that of the field, and the grass crop of Maine is worth \$42,000,000; that of the United States, \$600,000,000. Of the 24,000 species of plants which veil the face of nature, one-sixth are grasses. The known grasses of America and her islands in the sea, constitute more than one-twelfth of her "green things growing." Even the weeds, (plants not in place)—and who is sufficient to tell what *is* a weed—even the weeds await only an experimental future to reveal their place and purpose.

Of the thousands of grasses, but one, bearded darnel, (*solum temulentum*) is known to be poisonous.

### HISTORY OF THE GRASSES.

Americans have the honor of discovering that the natural grasses may be tamed, and the crop greatly increased and quality improved, by saving the seed. When the Puritans left England in 1620, clover as a cultivated grass was unknown there, and not till after a century did the English farmers sow the seed, and then only the chaff from their barn floors. Yellow clover was introduced in 1659. Perennial rye grass was first grown in 1677. This rye, or "ray" grass as it was called, was the first species of perennial grass ever sown artificially in England. It is now the leading grass in France. In 1700 white clover was introduced. At the close of the American Revolution, timothy was carried to England by the returning English soldiers. Orchard grass was carried to the mother country from Virginia in 1764. The sowing of grass seed was not practiced in Scotland until 1792. In the early settlement of the Northern Atlantic States, the colonists foraged their cattle upon the wild indigenous grasses, such as white clover, red-top, wire grass, Indian grass, secretary grass, and foul meadow. Foul meadow was found growing in abundance around Massachusetts Bay, as early as 1629. It grew wild at Madawaska before that place was settled by the Acadian French. Timothy, the herds-grass of New England, is said to have received its name from Timothy Hanson of Maryland, who brought it from North Carolina in 1770. According to some, it was first discovered in a swamp by one Hurd of New Hampshire. In England it received the name of *Phleum pratense*, or "meadow cat's tail." Where it originated is unknown, as it is nowhere found in a positively indigenous state. When red clover was introduced is not known. It was cultivated in Pennsylvania as early as 1770. Blue grass (*Poa pratensis*), is no doubt a foreigner, although it is said to have been found here in the days of the Indians.



## CULTIVATE A VARIETY OF GRASSES.

Sowing grass seed is a modern practice, originated long since the landing of the Pilgrims; but not as yet has it discovered the advantage to be gained by cultivating a greater variety. The prevailing practice, which seems like a determined abandon of all except three, or four at most, is without an obvious and even a specious reason for its existence. The dictum of the poet, "Whatever is, is right," must have a restricted acceptation in agriculture, when it disregards the logic of facts. Often thirty different species of grasses are found growing in a single sod, or from 600 to 1600 grass plants to the square foot. Nearly 1800, by actual count, have been found. From twelve to forty kinds of grass may be found in almost any old field. During the summer of 1877, forty-three varieties were gathered in a forty-acre field of mine and a neighbor's.

A certain quantity of seed—which quantity varies with the species—is required for a given quantity of land. The quantity, the seed dose, may be too *allopathic* or too *homopathic*. Experiments made with oats and barley, show the smallest yield of oats at one bushel, or five bushels per acre, and the largest yield at two and two and one-half bushels. With barley the smallest yield at one-half bushel, and five bushels to the acre, and the best yield at two and one-half and three bushels. The fault in the practice of most farmers is that they seed too little, not too much.

Every soil has a capacity for bearing a maximum number of grass plants of any one variety, and every species of grass requires a certain amount of room to insure its full development. Suppose eleven pounds of herds-grass to be the maximum for an acre, and twenty pounds are sown, then nine pounds are lost, and 9-20 of the acre left in unoccupied interspaces. On the other hand, while that acre may not have room for more than eleven pounds of herds-grass, it may have a capacity for three times eleven pounds, provided the mixture is composed of several varieties. This statement

of the case may not represent a precise condition of things, but it does present a truism worthy of thought.

To impress this point, which has a deal to do with success in grass growing, let me illustrate by a diagram which is made to represent a square foot of land, having a maximum capacity for twenty-five grass plants to five species of five each of herds-grass, red-top, blue grass, orchard grass and clover. With herds-grass alone it will grow only five seeds, or germinate the seed in five spaces, leaving twenty unoccupied interspaces, or four-fifths of the land in waste, or for weeds to cover. Adding clover, the land having a maximum for five seeds, and there are fifteen interspaces, or three-fifths of the soil unoccupied. If we add five seeds of blue grass, then three-fifths of the land is growing grass, and two-fifths—a generous slice—is left for weeds. Adding five seeds of red-top and five waste spaces remain, a waste which no farmer can afford. With five of orchard grass, the land is filled to its maximum, and no weeds do bidden come.

Every soil has a bearing capacity for many more varieties than most farmers are wont to suppose, and no one can reach the acme of success in grass culture, until he knows what that number is.

Nature abhors a vacuum, and in her abhorrence of "bare spots" in a grass field, she covers the nakedness with weeds. Where she gets her weed seeds is a mystery. Some of them may have lain dormant in the earth for years, only waiting for just such favorable circumstances as we have been stating. Some are brought by the winds and the birds and deposited in inviting vacant places. Seeds left within the Arctic circle by an exploring expedition, years after, brought to England, germinated. They retain vitality at a temperature below 37° F.

Nine varieties at least, nine being the minimum, are required to fully seed the land, that no unoccupied interspaces remain as a standing allegory of want. The "throwing out" of clover roots in the Spring, tells of an obstinate clinging to an old custom, an hereditary practice, for which we neither give, nor can give any rational reason. Nobody means to

blunder, yet a failure of grass to "catch," in most cases, is simply a pure unvarnished blunder.

### THE MIXTURE OF SEED.

The varieties of seed are determined to a considerable extent by the character of the soil. No "cure-all" prescription can be given which is best for every kind of soil, for grasses have their "likes and dislikes." Very few of them are cosmopolitan or at home everywhere. Herds-grass is really the only itinerate sort that can "board round" and take "pot luck" without a sigh for the sweets of home. Good herds-grass grows in the dyked salt marsh at Scarborough'.

The best success in seeding is based upon three conditions—*quantity, mixture and depth.*

For an acre, there should be forty pounds of such a mixture as shall give eight seeds to the square inch. This can be no guess work or "rounded up" measure, for, by a change of mixture, with considerably less than forty pounds, the number of seeds can be doubled; thus, with 3 pounds of red-top, 4 of clover, and 11 of herds-grass, or 18 pounds, we have 15 seeds per square inch, or with white-top, red-top and spear grass, each 3 pounds—or 9 pounds in all, there are 20 seeds per inch, far too many seeds, and not enough of varieties. Some knowledge of the size and weight of seed is requisite to prepare a mixture having the desired number of pounds and the required number of seeds—a pound of red-top having 15 times as many seeds as a pound of red clover. The sowing of grass seed is a centennial practice, yet its hundred years of experience can give but little practical information respecting the name, properties and uses of grass plants, or of those deserving cultivation for agricultural or economic purposes. If these things are not so, why in this "year of grace" do a majority of farmers limit the mixture to timothy, red-top and clover, mixed in all the possible mathematical permutations and combinations, and all the divisible proportions from five to twenty-five pounds? When land is seeded down to be in grass for years, (as is the



practice in Maine,) the mixture preferable in major practice, includes nine species—herds-grass, red clover, Alsike clover, orchard grass, June grass, red-top, foul meadow, Italian rye grass and meadow fescue. Blue grass may take the place of meadow fescue, and for late soils, is better. The quantity of each species composing this mixture, the weight per bushel, the number of seeds in a pound, and the quantity of each for an acre, are herewith given in tabulation :

NAME OF GRASSES.	Weight per Bushel.	Seeds in a Pound.	Quantity per Acre.
Timothy.....	44 pounds.	1,184,000	8 pounds.
Red Clover.....	64 “	256,000	4 “
Alsike Clover .....	63½ “	450,000	5 “
Orchard Grass.....	12 “	640,000	4 “
June Grass .....	13 “	3,888,000	2 “
Red Top.....	12 “	6,700,000	2 “
Foul Meadow .....	14 “	960,000	4 “
Italian Rye Grass .....	15 “	432,000	5 “
Meadow Fescue.....	14 “	416,000	6 “
		45,000,000	40 pounds.

This gives 40 pounds or 45,000,000 seeds to the square acre, 1300 to the square foot, or 8 seeds to the square inch. (Although Italian rye grass is ranked as an annual, it practically is a biennial. It is early and forms an admirable winter feed for sheep.)

Forty pounds per acre may look like an allopathic dose, but after deducting the “outs” for old and adulterated seed, errors in selecting, covering too deep, diseases, insects, birds and other mishaps, in most instances, one is left with “short weight.” Few know, and fewer ever ask, how much seed is lost by covering it too deep. Precise tests show that the greatest number germinate when covered one-quarter of an inch; at two inches, one-half is lost; at four inches, the whole. Let it never be forgotten, that it is not the quantity of seed sown that makes a good seeding, *but the quantity made to*

*live*. The seeds are small and proportionally weak in their powers of growth. An experiment made with thirty-three varieties furnished this fact: That of the thirty-three kinds, twenty-eight of them came up vigorous and strong at a depth of *one-half inch*; at an inch and a half, nine did not come; at two inches and a half, twenty-four would not come. Surface sowing in the spring, unless in damp weather, is a bad practice. A slight covering is desirable for the purpose of retaining moisture, because the seed must absorb its own weight of water before it can sprout. The method pursued by many of harrowing the grass seed is exceedingly objectionable. The best of all ways to "do it" is to sow plaster (sulphate of lime) after grass seeding.

Again, each species of grass has its own peculiar requirements. Rhode Island bent is delighted to find salt in the soil; the clovers luxuriate on lime. Some prefer alkaline soils, others can grow in the presence of soda only; thus, for want of judicious selection thousands of grass acres yield the most meagre returns.

In our present state of practical or chemical knowledge, we may not be able to tell what combination of grasses is best; but we can say without the hazard of contradiction, that a combination is best, and by effecting physical and chemical alterations in the soil, we may adapt it to almost any kind of grass. Sorrel, which by most farmers is supposed to be an evidence of "sourness" of soil, is said to be serving a good purpose in nature's economy, by liberating potash from the insoluble combinations in which it exists in the soil. Its "sour" oxalic acid is sweetening the land for clover.

The ash of plants is suggestive; one needs an extra feed of lime, another of potash. The findings of analysis are, for

	Potash	24 per ct.	lime,	15 per ct.	phosphates,	11 per ct.
Herds Grass,						
Orchard Grass,	"	29	"	8	"	8
June Grass,	"	31	"	6	"	10
Red Clover,	"	36	"	23	"	7
White Clover,	"	14	"	26	"	14
Meadow Foxtail,	"	37	"	4	"	6

From this table we infer that herds-grass needs nearly four times the lime of meadow foxtail, and orchard grass double the potash of white clover.

#### NUTRITIVE VALUE.

That the various species of grass differ very much in nutritive value, is shown by observation and analysis. Of twenty-two species analyzed, herds-grass was the most nutritive. Accepting analysis as a reliable guide, the following tabulated statement, calling herds-grass at \$10 a ton, exhibits the relative nutritive value of the grasses given :

Herds Grass, as the standard, at \$10	a ton.
Red Clover, is worth	8 “
Alsike Clover, “	9 “
Orchard Grass, “	5.40 “
June Grass, “	5.70 “
Red Top, “	6 “
Foul Meadow, “	4 “
Meadow Foxtail, “	3.30 “

It should not be forgotten that these are combined values of hay cured and uncured, and values per ton and per acre. For while these combined values show meadow foxtail to be but one-third of the value of herds-grass, and clover to be worth one-tenth more, analysis shows the solid nutritive matter of a ton of meadow foxtail to be nine-tenths the feeding value of herds-grass, and while a ton of clover is worth more than a ton of herds-grass, an acre of herds-grass is worth much more than an acre of clover, the shrinkage in weight of clover being twenty-four per cent. the most.

These theoretical values are useful and approximatively correct; yet experiments in feeding show the value of orchard grass, June grass and foul meadow to be much more than those of analysis. An idea clings like “beggar’s-lice” to many, that chemistry can tell the per centages of *flesh-formers* and *fat-formers* in food—that is, the fat and heat and flesh-producing proportions of hay. A chemist can take a given quantity of hay and tell how much water it contains, and how much carbon, nitrogen, sugar, starch, albumen, etc., but



when he "launches out" to tell how much one kind of hay, more than another, can supply to keep animals warm or to lay on fat, or to supply flesh, until chemical science goes far above its present perching ground, its conclusions are delusive.

#### NUTRITIVE EQUIVALENTS.

For the nutritive equivalents, or feeding values of grains and roots, as compared with hay, we are indebted to the researches of chemistry. As the tables of equivalent values coincide with the results of observation, they are accepted as not wide of the truth. Yet so much of the value of any food depends on the conditions and the circumstances under which it is fed, that it is impossible to make comparisons which shall at all times hold good. Indeed, while tables of kinds and quantities are valuable, the conditions of soil, climate, situation and requirements, are so multifarious, that no dogmatic rules can meet even a tithe of them; yet the mean of experiment and theory seems to show the comparative difference between *good* hay and other kinds of cattle food to be as follows, to which is added the relative value of manures obtained from the consumption of a ton of each of the different kinds of food:

100 lbs. of good hay are equal in feeding value to	275 lbs. of green fodder corn.
" " " "	154 " pea straw.
" " " "	164 " oat straw.
" " " "	200 " buckwheat straw.
" " " "	360 " wheat straw.
" " " "	200 " potatoes.
" " " "	300 " carrots.
" " " "	340 " beets.
" " " "	500 " turnips.
" " " "	57 " corn.
" " " "	59 " oats.
" " " "	64 " buckwheat.
" " " "	105 " shorts.

The manure from 1 ton of good hay, is worth \$5.85; from 1 ton of clover, \$8.75; from 1 ton of oat straw, \$2.62; meadow hay, \$2.50; from a ton of turnips, \$1.00; from a ton of cotton-seed meal, \$25.22.

From which it appears that the feeding value of three and one-third bushels of potatoes are equal to ten bushels of

turnips, and the feeding value of oats is nearly that of corn. In practice, one bushel of corn is equal to two of oats for fattening; but oats are altogether the best for growing animals than corn. If the hygienic value of roots, especially turnips and beets, could be estimated, it would show that they actually have a much higher feeding value.

The nutritive value of the different grasses and the nutritive equivalents, are subjects to which the best chemical scientists have given a vast deal of thought, still the whole subject is beset with doubt and uncertainty.

### FOUL SEED.

The quantity and purity of seed seriously effects the profit or loss of farming, yet what is being done to remedy the evil of impure seed? Nothing. This should be a work of the farmer's college, or of an experimental station. Often old and otherwise worthless seeds are mixed with new seed; but far worse are the weed seeds, because they live to perpetuate their kind.

Let me recite a few detections of weed seeds in grass seed. In a pint of clover seed were found 25,560 weed seeds; in another, 70,400; in a half bushel of herds-grass, were 1,000,000 seeds of weeds; and in a bushel of red-top, a still large number. In the seed sufficient for an acre, 4,000,000 weed seeds have been found.

If our old grass fields were carefully examined, probably one-third of the growing plants would be found to be pernicious weeds, innutritious and unpalatable, and which came in grass seed. A careful counting in a great number of fields, gave these results: In the first field of 30 plants, 26 were weeds; in field No. 2 of 38 plants, 30 were weeds; in field No. 3 there were 17 grasses and 23 weeds; the aggregate of the three fields being 29 grasses and 79 weeds.

Pig-weed, burdock and purslane, will yield each 16,400 seeds, or enough to seed three acres. Chess will yield 150,000 seeds to the pound. A single root of ox-eye daisy

(white weed) will yield 15,000 seeds. One pound of charlock, 4,000. A single plant of stinking chamomile, 46,000. Dock, 17,000; while an half acre of beggar's lice will grow seed enough to spoil the wool of 1,000 sheep. Charlock of very enduring vitality has been known to produce 8,000 seeds from a single plant. An English farmer whose instincts led him rather to poesy than the plow, after fruitless attempts to eradicate it, was thus inspired to sing :

“The kerlock plant is a zite to zee,  
As it zhines in the vilds like gold.  
But he zays, zays `e. `It aint no use  
Vor to go to a girt expense,  
Vor `twill come agen, whate`er thee does,  
Nor a year or two vrom hence.”

In a field chosen for the great trial of mowing machines in New York, the prevailing herbage was red-top, blue grass and fowl meadow. On close inspection, it was found that the field contained 55 forage plants, 10 grasses, and 45 weeds. The essence of this wandering out of grass into weeds, is to show the no inconsiderable injury from unwittingly sowing the seeds of useless and noxious weeds, and some of the cheating arts of dealers. It is no secret, howevermuch it may be practiced on the “sly,” that grass, as well as garden seeds, are purposely adulterated. There are large establishments expressly for adulterating and counterfeiting seed. One of the divers ways

To give the fields a foul seeding,  
And years of toil of weeding,

is to employ women and children to collect seeds of weeds and wild grasses, which are put into bags and labeled “pure timothy, clover, red-top, brown bent,” &c. An examination of these samples, showed that forty-one per cent. were worthless grasses and poisonous weeds, and eighteen per cent. incapable of germination. From another establishment, three tons of so-called red clover seed were sent to market, two-thirds of which was sorrel seed. In a ton of meadow fescue, were fourteen hundred pounds of foul seed. In a sample



marked "pure herds-grass," were weed seeds enough to give twenty-four to every square foot of an acre. In another establishment, where they have reached the climax of this kind of cheating, quartz rock is ground fine and mixed with clover seed. Few have any idea of on what an extensive scale the adulterating or "doctoring" seed, as they call it, is prosecuted. One establishment in London uses annually 20,000 bushels of old turnip seed for *doctoring*.

Very many of the worst weeds are introduced as flower seed. The Cone-Flower or Ohio Daisy now finds a place in many a florist's catalogue, its villainous character cloaked in the unpronounceable name of *Rudbeckia hirta*. That worst of pests, the Canada Thistle (*Cirsium arvense*), is a "run-away," a fugitive from the flower garden. In a sample of linseed cake from Russia, were found twenty-nine different kinds of very pernicious weed-seeds. Such a magnitude has the "doctoring" of grass seed assumed, by which new recruits are ever being added to the vast army of weeds which the farmer must fight, like Harry-of-the-Wind in Scott's novels, "by his own hand," that they should demand the establishment of seed-control stations, as in Germany.

To be poisonous is an extra vice of many weeds. Poison Ivy (*Rhus toxicodendron*), which causes a species of erysipelas. Poison Hemlock (*Conium Maculatum*), the "death-drink" in ancient Greece. White Snake-root, (*Eupatorium ageratooides*), regarded as the cause of milk-sickness. Mercury (*Acalypha Virginia*), thought to be the cause of the slabbering of horses. Horsetail (*Equisetum arvense*), causing the staggers, and Sheep Laurel (*Balmia angustifolia*), so fatal to lambs and calves. The prolificacy of weeds, these interlopers and freebooters of the grass field, is astonishing; the red poppy will ripen 50,000 seeds.

#### BOTANICAL NAMES.

Plants like the grasses, where the resemblance is very close, and where a great many kinds are known by the same name,

or one of them is known by six or seven names, it is very puzzling to know what is meant, unless the scientific name is known.

Unfortunately, farmers are inclined to be frightened at what they are pleased to call such "break-jaw" words. They can fight acres of weeds, but dare not master a word of *uncombinable consonants*, when the use of such hard words is their protection against fraud and imposition. Trivial or local names grievously misled. At least seven kinds of grass are called June grass, and not one of the tame grasses but what is known by or rather called by from two to seven different names. To make necessity for the use of botanical names perfectly clear, we give a few by which any scientific man, the wide world over, whether he can speak a word of English or not, will know just what kind of grass is meant.

If we say *Phleum pratense*, every scientist knows that it is neither an Alpine species, nor meadow foxtail, but genuine herds-grass. If we say *Agrostis vulgaris*, it is known that red-top and not foul-meadow which resembles it, is wanted. If we say *Poe compressa*, it is known that a peculiar species of grass is wanted, having its joints so flattened that it will not roll between the thumb and finger. So with the long list of grasses, employing the botanical name, an order for seed may be sent to the uttermost parts of the earth—provided grass seed is sold there—and the order will be rightly filled.

This may be a dry chapter, but like Hubbard squash, it is good because it is dry. Its omission would be injustice to our theme.

To resume: a botanical name employs two words; the first, usually an adjective, is the generic name; the second, usually a noun, is the specific name. As the kinds of plants are almost innumerable, they must be arranged into families, genera, species and varieties, so that they may be recognized, a division which is sufficiently comprehensive for the purposes of this paper. A genus is a subdivision of a family, a species a subdivision of a genus, and a variety a subdivision of a species. The whole subject may be illustrated by a single genus,

the *Pyrus*, of which the apple (*Pyrus malus*) is a species, and Baldwin, Greening, Russet, &c., are varieties.

The grass family is subdivided into 65 groups, or genera. These 65 genera are subdivided into several thousand species, and many of the species are subdivided into varieties. The genus bent-grass, to which red-top belongs, has nine species, the so-called brown-top being one of the number.

I have a grass of which cattle are fond. I wish to know what it is; I wish to know certainly. I take it into a farmer's club, where the language of botany is not understood; nineteen members kindly volunteer to tell me, each guessing a different name, viz: bent-grass, taller thin grass, hair grass, fly-away grass, thin grass, tickle grass, brown bent, dog's bent, Alpine bent, red-top, upright flowering bent, fine top, Burden's grass, herds-grass, dew grass, white-top, English bent, bonnet grass; yet, with such an array of names, backed up by such a "cloud of witnesses," I have a suspicion of doubt, until a twentieth, a botanist, says it is *Agrostis stolonifera*, or *Fiorin*, a variety of bent-grass.

If farmers would become familiar with the Latinized names of plants, this being the common language of science everywhere, it would save a vast deal of confusion. A garden flower, the pansy, with its "shining head of gold," and its dozen nicknames, affords an apt instance of the value of a true, or botanical name, known as it is, as heart's-ease, lady's delight, violet, step-mother, love and idleness, and Johnny jump up; when its Latinized name is *Viola tricolor*, meaning three-colored violet.

#### PASTURE GRASSES.

So far we have spoken only of field grasses—such as are or may be cured for hay by sun-drying a part of the water, for the best made American hay contains from 10 to 14 per cent. In the moist climate of England it contains 16 per cent. There is a striking difference in the per centage of water in different grasses. Meadow foxtail; when green, containing 80 per cent., and herds-grass only 57 per cent.



As nearly as can be estimated, the area in pasture is three times that in mowing field. Short as is the grazing season, the most of the growth of cattle and the most of the dairy products come from the pastures. Many of the field grasses are annuals and biennials; but for pastures they must be perennials, hardy and deep rooted, to bear the bite and tread of cattle.

Some one has said that a pasture is a place for cattle to *find* food; *to find food*—is this a slip of the tongue? for in many a pasture cattle need a *detective* to find it, especially where the occupants are bushes, brakes, laurel, hard-hack, sweet fern, and an army of acrid and bitter weeds, while the scanty grasses are rough, sour and wiry. As every grass has its periods of growth and maturity, and can only be kept succulent and fresh for a short time, several kinds should be sown together, all differing somewhat in their period of ripening, and the pasture will be much more durable and uniform, and in the later part of the season the feed will not all be coarse and tasteless. There are very many valuable pasture grasses, such for example as orchard grass, meadow foxtail, sweet-scented vernal, alsike, white and yellow clover, red-top, blue and June grass, rough-stalked meadow, tall meadow and sheep's fescue. Orchard grass, on good land, has no equal as a pasture grass; it grows early and late and is the quickest to spring up after close feeding.

How many farmers ever seed their pastures, and thereby greatly increase its yield? or rather how many never seed, but wait for the grass to come in, as it usually will do, but seldom of the best varieties, until it must of too many a pasture be said, that its herbage is little else than disagreeable intruders and troublesome weeds? The vegetation which prevails in the herbage of permanent pastures is known to change as the soil becomes impoverished or improved. If the fertility of the land be reduced either by over-stocking or by the withholding of proper manure, the finer and more valuable grasses become scarce, being over-grown by inferior ones; while in time even these deteriorate, and moss and

weeds predominate. On the other hand the foulest pasture may, under proper management, become covered by valuable grasses, although no fresh seed may have been sown. The turf of old pastures seems to contain the roots and seeds of a great variety of desirable and undesirable plants, which respectively flourish or dwindle out of sight, as the conditions for their development are favorable or otherwise.

On arable land, when any species of plant disappears its place is supplied by one of less value as an article of food, and thus the richest pasture comes in time to produce only the coarsest and most worthless species of grass. Look well to the neglected pastures, for of far too many of them it must of truth be said, "nothing from nothing, nothing remains."

#### NEW GRASSES.

New grasses and new friends, treasures of substantial value yet to be discovered. Hunt them up, and give a fair trial to each. Hunt them up, anywhere from Madawaska to the gates of sunset. Find them by the road-side, planted by the traveller's horse. Pick them in rough and secluded places. Pet and protect them, although they come from "Dixie's land." Because so many of our naturalized grasses so nearly approach their northern limit in the Sunrise State, it affords no evidence that those from a more equable climate will not flourish. Various facts demonstrate that the influence of climate is subordinate to that of soil and cultivation; soil first, culture next, climate last.

An examination into the geographical limits of most of the food plants, corn, wheat, potatoes, apples, etc., shows that it is not on climate, but cultivation, that their growth depends. If the requisite soil conditions are present, the plant will slow or quicken its growth to meet the extremes of climate. Barley, in Germany, requires fifteen weeks to mature; in Lapland but six weeks. Potatoes, in semi-tropical districts, require five months to grow; in Aroostook less than three months. Corn, which requires 160 days to grow in the Southern States, will grow and ripen in 100 days in Canada.



It is an axiom in vegetable physiology, that most of the edible and herbaceous plants are influenced by wet and drought more than by heat and cold. Because a species of grass is a native of a milder country, it does not follow that it will not succeed in a colder climate. Vital force in the vegetable, as well as in the animal world, is a wonder working force. It is something of which we are conscious; but of its nature we know nothing. Why, we ask, why, during the rebellion, those exotic recruits known as "counter jumpers," withstood the hazards of war vastly better than the boys from the farms, inured to the exposures of out-door life, unless the muscular labor of the latter had expended more of their vitality?

If a grass, not a native to the manor born, here finds a congenial soil, the influence of that soil with proper cultivation will naturalize it. Time may be required, for rarely does nature proceed by a leap. The lucerne of Italy (*Medicago sativa*), a plant allied to the clover family, as a result of difference of soil and culture, becomes the "Alfalfa" of California. The beautiful ribbon grass of the gardens, loses its stripe in a wet and muddy soil.

Just so far and so fast as this department of our natural history is explored, is it discovered what a large number of grasses especially suit each of our various geological formations of soil. England, with a land surface less than twice of Maine, cultivates 200 varieties of grasses, whilst our union of States, with its three million square miles of occupied territory, cultivates scarcely twenty.

We might name a large number of new grasses, native and foreign, which the appetites of animals have shown would be valuable acquisitions, but the subject in itself affords material for a separate treatise, and briefly noticing a few must suffice.

The first of our new friends to be introduced is *Fiorin*, or White Bent (*Agrostis stolonifera*), a desirable sort for pastures and moist mowing fields. Its stoloniferous (witch grass like) roots are more than a match for the "liftings" of Jack Frost.



Foul Meadow or False Red Top, (*Poa serotina*), is worthy of a place in a mixture for any land of a loamy texture.

Velvet Grass, or Soft Meadow Grass, (*Holcus lanatus*). No species stands drought better.

Meadow Spear Grass, or Nerved Manna Grass, (*Glyceria nervata*) frequently known as "bastard foul meadow," is a very valuable pasture grass.

Barn grass, (*Panicum Crus galli*) of which there are 400 varieties, is exceedingly nutritious and hardy, and will hold its own against great odds. Although a great pest in a corn field, it will furnish more valuable forage, per acre, than any other grass whatever.

Buffalo Grass, (*Buchloe dactyloides*) a nutritious perennial of great endurance, withstanding the tread of cattle better than any other species.

Gama, or Sesame Grass, (*Tripsacum dactyloides*); large, beautiful and hardy. Best for moist soils.

Mesquit Grass, (*Boutelona oligostachya*). A native of Texas; winters well in Maine.

Several forage plants, not true grasses, are worthy of trial, as several varieties of wild pea, highly prized in the West. Several Oregon clovers and California trefoils, and a variety of geranium (*Erodium cicutarium*) are forage plants of great value, are hardy, and are rich in nutritive matter.

Each succeeding year adds to the list of herbage which may be made use of as forage plants, for many of the sedges and rushes, as well as many of the true grasses, now neglected as worthless, or discarded as weeds, are found to be friendly and palatable to horses, cattle and sheep. Even broom sedge, cut before the seed is ripe, makes good hay. The moose and the deer thrive and get fat on moss and "browse." Cotton seed, so valuable a cattle feed, a few years since was considered of no value. The popular notion, that only a few of the grasses are worthy of cultivation, like the doctrine of the "divine right of kings," is numbered with other obsolete notions of earlier ages. I am convinced, from experience and observation, that the most of farmers

suffer serious loss from negligence in growing a greater variety, or rather a greater mixture of varieties, and that by taming, and making friends of many more of the wild and uncultivated grasses, their forage crops would yield them a larger reward for their labor and capital. The cultivation of grass—the king among crops—the land devoted to it, the care and cost of harvesting and housing, the millions of animals subsisted by it, the money value realized from it, the force of the expression “all flesh is grass,” unitedly demand a breaking up of our “cut in alabaster” mode of grass growing. He who makes the acquisition of a friendly grass, doubles his material resources, and to this end our skill, industry and research should be directed.

“Begin, be bold, and venture to be wise,  
 He who delays this work from day to day,  
 Does on a river’s bank expecting stay,  
 Till the whole stream that stopt him shall be gone,  
 Which runs, and as it runs, forever will run on.”

#### DISCUSSION:

Mr. KEYES. In order to raise good grass, a man wants to know the time to sow seed, and the amount necessary to the acre, and the time to cut the grass. These three things seem to be absolutely necessary. I had a piece of ground a few years ago that was so wet that I could not seed it in the spring. I thought I would seed it in June. There was a little place I could not get to. Finally, it was left until some time in August, when I plowed it, spread my dressing and seeded it down, and it made an excellent piece of grass land. The next year I got about the best crop of grass I ever grew. In seeding, we ought to know how much we shall put on an acre. Our friend says forty pounds to the acre. That seems to be placing them rather thick. In putting on clover seed we find two hundred seventy-six thousand two hundred ninety-six seeds to one peck, and in one square inch we have five seeds. We frequently put on red-top. I never had courage to count and find the number of seeds in a peck or

even in a quart of them, but I suppose there are about eight seeds to a square inch. Some say twenty pounds clover and half a bushel of herds-grass to the acre.

It seems to me too bad to feed late cut hay to cattle. There is a man near us who never begins to cut his hay until September. You can trace his line by the grass standing while all his neighbors have cut theirs. He has much foul meadow on his farm. Late cutting does not make so much difference with that as with English hay. I have had a little experience with Alsike clover. It usually will last three years.

Mr. ROBINSON. I have sowed Hungarian grass twice. The first time I had a good crop. The second year I sowed it the crop was rather light. I cut it about the time I cut my grain. It makes good fodder.

Mr. BRACKETT. In regard to this Hungarian grass. Some years ago I grew some of it, when it was first introduced. I grew it for the seed and let it ripen in the field. In the winter, as we fed it out to stock, so far as we could judge it was equal to the best hay we had in the barn. There is a large amount of foliage, and it makes a very good fodder. It is my impression it would be a good supplementary crop. It is an annual grass, of course.

Mr. HARRIS. I raised about half an acre of it last year, and I am feeding it now to a horse which I am driving, and I regard it as the best kind of hay. My horse eats it well and seems to love it, and I am fully satisfied that it is a crop worth raising, and it makes a handy supplement. I used half a bushel of seed to the acre. It was a piece of old grass, that would have been hardly worth mowing, and I plowed it and sowed this Hungarian seed about the first of July and cut it about the first of September. The fertilizer which I used was the Stockbridge. The President of the New England Agricultural Society stated in Portland last fall, that he cut eighty tons of it, and regards it as the best hay he has on his farm. I would not advise any farmer to try to raise



Hungarian on a very poor piece of land. It is a crop we wish to grow in a short time, and it requires moderately rich land.

Dr. NORTH. I have had some experience in raising it, and I consider it one of the best fodder crops we can have, but so far as I have any knowledge of it, it is not a grass that can be raised on poor soil. The richer the land, the larger the crop you get. Both Hungarian and millett require rich land, if not you will not get the return you expect. I do not think I ever had any hay that my cattle would eat better, unless, perhaps, orchard grass. They are fond of both. I think the difference between orchard grass and millett, so far as the crop is concerned, is small, but I prefer the orchard grass. If you put it on ground not very rich, you will be likely to get better returns. I have sowed some orchard grass. I think I have five acres now. I consider it very valuable for hay if cut at the proper time. It ought to be cut early, for if allowed to become hard cattle will not eat it very well. I would cut it before the bloom.

Mr. LELAND. It seems to me that orchard grass is a perfect nuisance. It ought to be cut very early indeed, and it is almost impossible to keep it out of the dressing so that it will not get all over your farm; and when cut late cattle will not eat it any better than rye straw. I believe I would rather put my money into the fire than into orchard grass.

Mr. ROKES. We regard Hungarian grass as a better crop than millett. It has been claimed that it was injurious to the milk if the seed was formed. There is no doubt it can be easily raised, but we do not make any great account of it as a hay.

Mr. FARRINGTON. I have had a little experience in growing these crops, millett and Hungarian and orchard grass. Three years ago I sowed an acre of land with a mixture of herds-grass, common red clover, Alsike clover and orchard grass. Had I known then what I know now, the orchard grass would have been left out, because, as a result, for the next two years we got no orchard grass. Just as the clover was in full bloom, the orchard grass came up. The students

would ask, "Mr. Farrington, what is that grass?" I had not observed particularly, and I looked over the field, and there was occasionally a spire of this grass coming along. I took quite careful notice, and perhaps there were twelve of these plants through the field. That field was mowed, and this winter a man who takes care of the cattle handed me a stalk of grass and said, "The cattle will not eat this at all." I told him it was orchard grass. The herds-grass and other hay had been eaten clean and this spire left in the crib. So I would agree with the gentleman who made the statement that it is not well to sow orchard grass with other grasses. I sowed three-fourths of an acre last year and got a good crop, but we had to mow it about June. When it is cut at a proper time the cattle eat it clean, and the returns of milk are much better than where we use fodder corn. As a soiling crop it is also excellent, and sown on proper land and harvested at the right time I have no doubt but that it is a desirable crop.

Mr. FLOYD. I will say in regard to this subject, there was an acre of ground in Kennebec county sown to the Hungarian grass, and I had a great deal of interest in it. It was on a high ridge and grew well. I asked the man who raised it, and he said that it produced two tons to the acre. He had no trouble in curing it. It was good weather when he cut it, and it cured well, and his stock ate it well. I think we need a soiling crop in the State of Maine. Our pastures begin to fail about the middle of August, and people who have dairy stock must do something to keep up the supply of feed, and the great question is how to do it. I consider it one of the most important questions. Hungarian grass has been proposed, and I will propose sweet corn. I have had some experience in this variety. Last year I obtained some seed of an excellent variety, which grows eight, nine and ten feet high. I planted early, on a warm, dry piece of ground, and about the middle of August I commenced to cut it for the cows. They ate it well and it increased the quantity of milk, and I think it was a very profitable crop. Later, I picked off the ears and fed them to my hogs, and gave the



fodder to my cows. I intend to plant more this year, and as my friend has proposed Hungarian, I will say sweet corn. I think if he will try it, he will like it. It can be used green or cured. It will cure better than the old-fashioned corn. I consider it worth double the amount of Southern corn. My manner of cultivating is as follows: I prepare the ground and put on the manure in the fall. I take a harrow and run it lengthwise twice and then spread the manure lengthwise in the row and mix the soil with it pretty thoroughly. After soaking the corn twenty-four hours, I sow it in rows, not so thick as one would sow the Southern corn, about a bushel to the acre. After the corn is up ready to hoe, I run a cultivator through it; and I have gone through with a hoe. I do not feed it until the ears are pretty well formed. The cattle like it well. I have some dried. I tried it first as an experiment. I have tried common field corn, and I find cattle can tell the difference between sweet corn and the other pretty quick. I think some cattle have very good judgment in regard to what they eat. I do not think it is as good for horses, but for cows it will make more butter than English hay.

Mr. KEYES. In regard to raising sweet corn for fodder, my idea is that it is as good as English hay, whether you have a horse or not. We sow a great deal of it in Franklin county. I fully believe in it as a feed for cows. Sweet corn planted early is not so apt to do well as that planted a little later. It wants warm ground. My way of planting perhaps varies a little from the course pursued by others. If I was planting for fodder, I should put it in hills about one foot and one-half apart, and from ten to fifteen kernels in a hill. We want something to feed our cows after the frost comes. This fodder, cured, is a very good feed, perhaps not so good as when green, but it is better than anything I have ever had, and I think very highly of it.

The CHAIRMAN. I have raised considerable sweet corn for canning, and I got the idea that it was good for cows for milk, and have gone to raising it. It does well with old manure, the richer the better.



Mr. BICKFORD. I have had a little experience, and generally sow about three acres of sweet corn. We manure it broadcast, and harrow it well. Our corn is sowed in drills, somewhat as you would sow turnips. It is easier than to sow by hand broadcast. I generally keep about half or two-thirds of it dry. I think we get as much as ten or twelve tons of fodder from an acre.

Dr. LINCOLN. I want a little more light on this matter. I wish to know if it is considered that it will pay to buy the Stockbridge fertilizer at twelve dollars an acre to raise this fodder corn. I don't think it is well to plow a good piece of grass land to sow the Hungarian grass seed on it.

The CHAIRMAN. I will say to the doctor, I take a piece of land that does not bear any hay, and I turn it over and put the fertilizer on, and I raise a fair crop of Hungarian where I should otherwise have got comparatively nothing. I do not think it advisable to plow up good grass land for the sake of sowing Hungarian, but I hold that it is valuable for a piece of ground bearing scarcely anything, and in many cases will pay a farmer well.

## SEED CORN.

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BY E. LEWIS STURTEVANT, SOUTH FRAMINGHAM, MASS.

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Whichever variety we select to plant, it is of extreme importance to obtain the proper seed. We feel disposed to ascribe more importance to the character of the seed used than to any other one feature by which we influence our crop, for he who exercises judgment in his seed is pretty apt to exercise judgment in the culture of the plant which it produces, and to obtain profitable returns.

The seed has an hereditary character, which causes it to transmit the peculiarities and habits of its race, and just as fixed as is a peculiarity by human intervention, are the chances for its appearing in the crop. There seems to be a natural amount of crop for each species to bear. This amount can be readily grown by any farmer who will keep free from weeds and supply sufficient manure. We all know how manure seems to show in the crop until a certain amount has been supplied, and then the extra amount does not increase the crop in proportion. If 20 cart loads of dung applied to a field admits of our raising 50 bushels of corn, it does not necessarily follow that 40 cart loads will give us a crop of 100 bushels, and 80 cart loads a crop of 200 bushels. Many a farmer by using dung freely can raise 50 or 75 bushels of grain to the acre, but how difficult it is to be sure of 100 bushels or 125 bushels per acre. The fact is, that it does not require a very high class of seed to raise 50 bushels of corn to the acre, and if we consider this the normal productivity of the seed, it is quite easy to raise this 50 bushels by applying dung, and ordinary care. When, however, we ask 100 bushels, we are getting beyond the normal capacity of the seed, and thus meet with a check. In fact, we have shown

by one of our experiments, that the same field which unmanured produced at the rate of 68 bushels of corn to the acre from one kind of seed planted, produced with another seed but 55 bushels, although this last received an abundant manuring.

As a rule our best farmers manure beyond the capacity of the seed to furnish crops, and thus there is met a loss, more or less great according to the location and the system of farming. In collating the returns of the agricultural societies of Massachusetts, we find as an average of 86 returns, that it takes 28 loads or 7 cords of manure, to produce an average crop of 81 bushels, as measured or weighed at harvest, besides a greater or less application, in individual cases, of a superphosphate. This amount of dung calculated by the average composition of manure, would contain the plant food three times in excess, at the least, of what the crop removed. Through the application of slightly more than one-fourth the amount of this plant food in the form of chemicals, we have raised equivalent crops in our own experience, and have proved that the same amount of manure applied to two different seeds, but in less quantity than in our collated statement, viz: six cords, produced 55 bushels and 110 bushels of crop, respectively. We can also add, that it is probable that increase of manure applied, in either case would have resulted in but a slight increase of crop, for in each case there was sufficient to feed the plant to the point of yield which its heredity had assigned to it.

We are disposed to dwell upon the importance of carefully selected seed to the farmer, as we see its bearing so little understood by those whose studies should lead them to its appreciation, and results claimed for experiment which are fallacious; we refer to the comparative experiments on the action of manures and fertilizers.

If two farmers, neighbors let us say, own each a cow, the one a superior animal of large milking capacity, the other a very inferior animal. The owner of the superior animal feeds high and obtains 20 quarts of milk at the flush. He



increases his feed and increases his milk, but one day he gets more milk than another, and the more milk the cow is forced to give, the greater the variation between the daily milkings. The owner of the inferior cow asks his neighbor what causes him to get so much milk, and the reply is, the feeding of corn meal and shorts, all the cow can eat. So the owner of the inferior cow, who never obtained over 10 quarts at the flush, concludes to force his cow. He feeds corn meal and shorts as directed, but although his milk yield is increased slightly, we will say to 11 or 12 quarts, he can get no more, but his cow gives about the same amount daily. The two friends get together and talk it over. They compare notes and find that the difference in the yield is in the cows, and that the better the cow the greater daily variation when forced to their limit; they find that corn meal and shorts do not furnish milk, but simply act as food to the cow, and it is for her to manufacture this food into as much milk as she is able; that the cow of large yield, doing her best, is more subject to be interfered with by extraneous circumstances, than is the other cow; that reducing the food of the one cow is followed by a diminution of milk, and that diminution of the food given to the other cow affects the milk yield but slightly. Being men of a certain intelligence, they note that feed as they will, the cows will not dry up entirely, but will turn some of their food towards milk production, and that increase of the food supply will affect the one cow in her yield far more than the other. If the cows are receiving less food than they require for the support of an active life, doubling the food supply may double the milk yield, but quadrupling the food supply will not quadruple the milk yield, and the only way to obtain the largest amount of milk from a given amount of food is to feed out supplies to cows of a superior character; to keep a superior animal for the conversion of the food.

In this case, we never hear of the farmer finding fault with the miller, and claiming that the food fed is worthless, etc. Yet, these same farmers will use a seed corn which cannot normally yield over 35 or 40 bushels per acre, apply super-

phosphate, or some complete fertilizer, and then growl because their crop is not increased over five or ten bushels by the application. An experimenter will use a seed of which he knows nothing, and which possibly can be developed to its normal yield capacity by the unfertilized or partially fertilized soil, will apply different fertilizers to various strips, and in the harvest, attempt to estimate the value of the different applications, taking no note of their physiological action on the plant, and overlooking the fact that the hereditary capacity of each kernel used as seed is probably different through their possessing a different male parentage. Manure is applied to one strip, and fertilizer to another, and although through the character of the seed variation, between two equal adjoining spaces under like treatment there is as great a difference in the crop as in the two plots experimented on, yet the comparative harvest of the two little pieces under treatment is supposed to show the efficacy of the manurial treatment. One man doubles the quantity of fertilizer on a portion of his field and sees no corresponding crop as the result, and immediately claims that he has been cheated by the fertilizer dealer, because a neighbor who has purchased fertilizer elsewhere has received the benefit on account of feeding it out to a superior seed. One man says he cannot raise corn because he does not own corn land; another man avers that fertilizers don't act with him as with me, because I can buy through my opportunities a better article. Another man still, says he cannot use fertilizer because it don't increase his crop sufficiently to pay for its use. Did it ever occur that this different testimony oftentimes comes through the effect of the seed and not from the fertilizer? I must believe it, because experiment tells me that increase of fertilizer increases the crop from one seed, and gives no corresponding increase with another. Whenever I feed extra rations to a superior cow, I get better returns than when I give the like feed to a poor cow. Whenever I feed a corn plant from a prolific seed variety, I get better results than when I give the same plant food to the

corn plant from an inferior seed variety. I can obtain twenty quarts of milk a day easier from one cow than from another ; I cannot, no matter what my feeding, obtain twenty quarts of milk from some cows. Just so I can obtain 100 bushels of shelled corn from one variety of seed by furnishing culture and the plant food ; with another seed I cannot so easily get 50 bushels per acre, even by doubling the manure supplied, while the 100 bushels is an impossibility.

Now, whoever would use his manure most economically ; whoso would purchase fertilizer so as to make a profit ; whoso would raise maximum crops, must commence his operations with a supply of good seed which is capable of responding to his culture and manure ; and then in order to obtain the most profit he must not strive to obtain a larger crop than his seed is nominally fitted for.

While crossing the ocean in an Inman steamer, some years since, I enquired the amount of coal consumed, and was told 80 tons daily ; I asked the speed, it was so many knots ; I asked how much extra coal it would require to increase that speed a mile an hour ; the reply was, about 20 or 30 tons, and that every mile of speed beyond a certain point was produced at such a cost as to be unprofitable. Just so with our farming ; every bushel of grain beyond a certain limit for each variety, is produced at such an excess of expenditure as to be unprofitable. He who uses a seed corn whose ordinary yield is but 40 bushels, cannot afford to attempt to obtain more than forty bushels for a crop ; he whose corn is capable of 100 bushels of crop, should not be satisfied with less, but should strive for no more through the application of fertilizer alone. If the grower of the forty bushels desires to grow a larger crop, let him seek a seed corn which can turn out a hundred bushel yield in the presence of plant food and proper culture.

Whoever tries a comparative experiment with manures, using a seed of forty bushel power—as we shall express it—will be apt to come to a different conclusion from that man who tries the same experiment with a seed of 100 bushel power. Sometimes, through a combination of circumstances,



an inferior seed may occasionally yield a large crop, yet the crop cannot be maintained as an average production without improvement in the seed, as is shown by the great variation which occurs between the yield of different fields, planted with the same seed, and whose differences of product become greater as the crop is forced the hardest by manuring, or high culture.

From what we have said, it will be appreciated that we believe in good seed, and that we also believe that manure can produce a larger crop from one seed than another; that fertilizer purchased may be money wasted with one seed, money in the pocket with another; that no yield should be striven for through the application of manure beyond the profitable point, and that the better the seed the more manure can be profitably supplied, and the more fertilizer profitably purchased. There is too close an economy (a false economy) among farmers in the purchase of seed. A farmer who averages but forty bushels an acre with good culture and fair manuring, can well afford to pay ten dollars for the seed for an acre which comes from a variety which habitually yields 100 bushels under equivalent circumstances. Yet how is he to know when and where to buy? This introduces us at once to the question as to the principles which should govern the selection of seed corn.

In obtaining seed corn there are two fundamental directions. 1st, select that race or kind which is fitted for your climate, your uses or your market. 2d, select that variety which shall afford the most profitable crop. Thus we have three kinds of corn: Sweet corn, which bears a wrinkled seed when mature, and which abounds in glucose and sugar. Field corn, which possesses a kernel of various character, but never wrinkled, whose interior is quite starchy in appearance, and whose outer coverings may be either flinty and smooth, flinty and indented at the crown, or neither flinty nor indented, but smooth. Pop corn, whose distinguishing peculiarity is its flinty character with the oil distributed throughout the seed.

The uses and the market will confine the choice of kinds to some of the field varieties, and the exigencies of the Maine climate will cause her farmers to select a flint variety of the field division. The most profitable variety is the one which will furnish not the most grain necessarily, but the largest gross return from the field. We mean by this, that in a stock feeding country where provender must be provided for long winter stabling, the fodder of corn has a value, and that this value must be considered in our estimate of the field.

Under ordinary seasons and ordinary culture, with our Northern varieties of corn, about 80 lbs. of stover in an air dry condition may be calculated to accompany each bushel of grain, sometimes more, sometimes less. If this stover is fine stalked and is harvested in reasonably good condition, it is capable, with the addition of a little meal or cotton seed, of replacing hay, and will be found worth, as fed whole to cows, about six-tenths the value of good hay. If, however, this stover is coarse stalked, it is not so readily consumed by the cows, and is certainly not worth in practice one half this, or three-tenths, and we have seen stover that we have estimated even less. It is thus seen, if we are correct, that two fields may yield the same amount of grain, and yet furnish a gross produce of different values for the farmer.

One principle, then, to guide us in the selection of seed corn, is the fodder habits of the plant. As the cob is morphologically a branch, and as a branch need not be expected to be larger than the stem which puts it forth, we would expect a corn with a large cob to have been produced from a large stock, and thus from a coarse foddered plant. However the explanation, a quite extensive observation confirms to us the fact. Hence in selecting a seed ear, we should select one with a small cob, as thus being more likely to give us a small stalk to our fodder.

Should an 8 or 12-rowed corn be taken? Why not a 36-rowed corn? It is sufficient that experience shows that a 36-rowed corn is not adapted to the Maine climate. Is 12-rowed corn as well adapted to the Maine climate as an

8-rowed cob? It appears to us not, although we admit that a good 12-rowed seed is preferable to a poor 8-rowed seed. We can offer for argument, that as we go northward, the number of rows of corn appears to lessen; that 8-rowed seed is used more frequently in New England than the 12-rowed; that 8-rowed corn moved south tends to increase in rows, and that 12-rowed seed under unfavorable conditions tends to form an 8-rowed variety, as we have been informed. Moreover, the yield of grain from a good 8-rowed cob, is as large as the yield of an equivalent length of a 12-rowed ear, because the corn of a good 8-rowed variety is deeper in the kernel than the 12-rowed. Additionally, the 8-rowed tends to a smaller cob, to a more uniform kernel, and to an earlier maturity, while we have no evidence to show that its fruitfulness is less.

Should a long or short ear be taken? We believe that it is best to use the long ears of the variety selected, but we ourselves generally estimate the length by the number of kernels in a row, in connection with the length of cob. The number of the ovules is determined by heredity—the length of the cob as well by the expansion of the kernels as by the completeness of the fertilization in the individual ear. A perfect fertilization and plenty of plant food, usually produce a fat, plump kernel, which, together with the reciprocal influence of the pollen on the cob, tends towards elongation. It is easier through culture to plump our kernels, than to increase their number, hence the importance of considering the number as well as using the foot rule. This question must be deemed unsettled. We think, however, that the length is governed by climate, and that it is not well to attempt to secure a larger ear than our locality warrants, through the tendency to coarseness and looseness which may be thereby produced. Of one fact we are certain, that the length of the ear is no indication of the amount of crop which the variety yields, for we have before us two ears, both very fine and perfect, the one 12 inches long from a 45 bushel crop, the other 6 inches long from a 100 bushel crop.



What portion of the ear should be planted? We must offer advice here entirely from theory, as we know of no satisfactory and conclusive experiments having been made. It looks reasonable, and seems supported to a certain extent by fact, that the lower kernels retain variety characteristics longer than the tip kernels. We all are familiar with the fact that the butt kernels ripen before the tip kernels, and thus we are led to infer that the maturity of the variety may be forwarded through the selection of these, the earliest kernels of the cob. We would also expect that the selection of tip kernels would have a tendency towards elongating the ear, and the selection of butt kernels to enlarge the cob and increase the number of the rows. The natural form of our northern flint corn is a sphere, as may be observed in every case when the kernel is grown freed from pressure. The flattened appearance we observe is produced by their crowding. We hence should not expect malformation of the seed as caused by pressure to be perpetuated through the seed, and need consider but the character of the cob and the size of the seed in our selections.

If a corn-stalk be taken just preceding the bloom, and cut across at each joint, then will be perceived at each node, from the second to the fifth or sixth generally, in our northern varieties, an undeveloped ear, seemingly perfect in its minuteness, and apparently capable of being formed into a perfect and large sized ear. We shall notice that the upper ear of these is the largest and furthest developed, but no more perfect than the lowest of the series. If we watch the plant during growth, we shall observe that the upper ear is first prepared for pollination, and immediately it receives the pollen its power to attract nutriment from the stalk is such that it seems to grow at the expense of the unpollinated ones, for it increases in size rapidly while the lower ones remain stationary and finally dry up. The importance of this observation is in the showing us that nature intended each stalk to be fitted under proper conditions for the bearing of at least five ears, more or less, according to the variety; and we all of us

very well know that we frequently find two ears fully developed on a stalk, less often three, and rarely ever five or seven. Such being the case, we are justified in believing that we may be enabled to accomplish through our interposition this result as a normal rather than exceptional result. We may influence and even increase the tendency of these usually abortive ears to develop into kernel through cultivation, but our great hope must be in the proper fixing of an inherited tendency, by a strict attention to the selection of the seed. Before, however, entering upon this consideration, we will outline some botanical features of the plant.

Maize is what the botanists call "monœcious," that is to say, its male and female bloom is borne on different portions of the plant. The tassel bears the male or stamiferous organs aloft, above the rest of the plant, the female or pistilliferous portion being arranged along the cob, which is morphologically a branch and which is placed between the leaf sheath and the culm or stalk, forming a grouping by themselves corresponding in position in the same variety. The male flowers bear pollen in their anther cells, which being set free is carried upon the silks, the stigmatic surfaces of the pistils, which its contents enter through a provision of its physiological nature, and passing down mingle with the contents of the ovule which is thus enabled to carry forward its development into a seed. But mark this: the pollen is usually cast off from the tassel before the pistil of the plant is ready to receive it. We thus see a clear provision of nature in favor of the pollen serving to fertilize another ear than the one on the plant which bears it, and we must suspect, what the accurate experiments of Darwin has shown to be the fact, that self-fertilization must be injurious to the species. Let us remember this, for we shall see its application a little further on.

Now, if we have a peculiarly prolific stalk of corn, its seed does not probably receive its pollen from itself, but from another adjoining a distant plant, and the character of this pollen is to influence the succeeding generations which spring



from the seed which is the result of this pollination. If we take an average corn field and count the number of tassels and good ears in a hundred hills, we shall find something under half barren; or, expressed more particularly, we shall find one hundred pollen bearing stalks and but rarely over fifty *good* ears of corn. The chances are, therefore, at least even, that one prolific stalk has been fertilized from an unprolific plant, and very slight of being fertilized from a plant as good as itself. In planting the kernels from this prolific plant we cannot, therefore, hope to continue the same prolificacy in its progeny, for the seed partakes of the nature of both its parents. Even more, each seed of the ear is not fertilized from the same plant, but there are many different qualities derived from as many different male parents, gathered together on the one cob.

We now see that the appearance of the ear of corn, its length, the regularity of its rows, etc., is no sure index of its quality for seed, but that in order to secure good seed we must know somewhat of its history; must know how prolific it is, and what are its antecedents. In our agricultural fairs, by giving premiums for seed corn from the external appearance alone, much injustice has resulted. As for the effect, the ambitious farmers have been enticed into selecting a few long fine ears from large fields of corn, and have been led to sacrifice true utility to show. We have never known the seed corn committee to report the proportion of grain and cob on winning traces, nor which has produced the most grain for a given length of ear, nor to ask what was the yield of the field from which the exhibit was made, nor from whence the seed was procured, and for what peculiar properties the premium was claimed. No; the fourteen inch ear from a forty bushel yield will take the honors from the eight inch ear taken from a hundred bushel yield, and yet the wise farmer should pay for the seed of the one field, and might wisely reject with contumely the seed from the winning trace.

The true principle or rule, at the foundation of successful corn culture, is to select seed of a variety adapted to our



uses, market and climate, which has prolific parentage, through the largest series of generations possible. In order for this, we must plant our seed fields by themselves, away from other corn. We must then at the period just preceding the bloom go through our fields with a knife and ruthlessly cut away every feeble stalk, every overgrown stalk, every stalk which departs from the type of growth that we desire, and above all, of every stalk which does not show indications of bearing several strong ears. In this way only can we ensure the fertilization of our seed corn by pollen from productive plants; and in this way only can we intelligently keep the heredity of the plant in the direction of the continued prolificacy that we should desire.

Who will give us this seed corn? The Waushakum corn was thus treated during the season of 1877, and notwithstanding the great destruction among the plants, the harvest was 77 bushels per acre. Not a large yield it is true, but this seed was all fertilized by pollen from prolific stalks, and must give results in the coming year beyond what it has previously done. Thus far 123 bushels has been our maximum crop; but with this seed we should expect more under like circumstances of season and manuring. We hope in a few years to bring the capacity of our seed equal to a 200 bushel crop, and the more we improve our seed the more ready we shall be to increase our purchase of artificial fertilizers, which we use largely, and in some fields exclusively for its growth.

The type which we prefer for our locality, and which we have largely acquired, is as follows:

*Waushakum Corn.* An 8-rowed, yellow corn, about 45 kernels to the row, and 9 inches long; cob, small; ear as large in diameter at the top as at the butt, forming a true cylinder. Kernels projecting over stalk at butt and rounding over the tip, even in size and compactly arranged; butt compact; very flinty. A bushel basket even full of ears as thrown in loosely, will shell half a bushel and a pint of grain. Weight of grain, 64 lbs. to the struck bushel. About 80 lbs. of air dry fodder to the bushel of grain, under our system of

culture. On selected specimens about 10 per cent. of cob. Maximum yield with us about 123 bushels; average yield about 80 bushels from 18 to 20 acres. A single kernel has produced 23 ears under experimental culture.

What improvement do we ask for this corn? We desire to lengthen the ear to 50 kernels at least; we desire to fix the small cob so as to reduce the variations which arise from difference in manuring and culture to the minimum; we desire to increase its prolificacy to 200 bushels, at the least, for a maximum crop, and 150 for an average; we desire to bring the fodder proportion down to pound for pound.

We do not wish to be understood as claiming for Wau-shakum corn a superiority over every other known variety. It is simply brought forward here as an example of a definite attempt to produce a seed corn which shall have a fixed character, and as an illustration of the practical form of the ideas we have enunciated. Before there can be the greatest improvement many people must join in the effort, and each locality species must be brought up to the full capabilities of its nature, in order that through hybridity the greatest harvests may be annually secured.

It seems necessary to now summarize our points in the form of advice, which best appeals to common sense, and must be judged by this standard, not from any authority on the part of the writer.

Any farmer who finds a neighbor occupying no better soil, and possessing no advantage over himself, but who raises a larger average crop of corn, should consider the necessity of changing his seed. Let him first see if the seed he desires is to be obtained in his own neighborhood, for if such he finds, it will probably be acclimated and better for his uses. If this resource fails him let him seek for a corn which shall seem adapted to his climate, and which is known to have yielded large crops, giving preference to that seed which is raised under conditions quite equivalent to his own.

Corn from a northern locality is, other things being equal, to be preferred to that from a southern locality, yet it does



not follow but that circumstances may strongly recommend a corn seed which has been grown in a climate more favored with warmth. Let not the choice be unduly influenced by the size of the ear, for the size of the crop is far more important. Do not consider your own corn as perfect, or any seed you may obtain as being beyond improvement. When your seed is obtained, manure judiciously, neither too much for profit nor too little for the needs of the plant, and cultivate frequently and timely, remembering that through the process of cultivation the development of the plant into fruitage may be hindered or aided, and that this process is under your control.

The growing of seed should be a specialty, requiring as it does constant care and thoughtful observation. A grower of seed by business should always surpass the farmer with whom its growing is but incidental; and the best farmer is the very one who can encourage profitably to himself the seed raiser, by purchasing at a price which will remunerate for the trouble which is required. We do not wish to be understood as discouraging the farmer from improving his own seed, for this he should do, for improvement will always follow his judicious efforts; we but express the belief that until the growing receives the farmer's absorbing attention, he cannot hope to equal the results of him who makes the growing of this seed his constant business. As the world is at present constituted, there must be always those who have to sell and those who desire to buy. If one farmer in a neighborhood will raise better corn and larger crops, he must necessarily find a market for his surplus of seed the moment his neighbors discover the fact, and have faith in the honesty of his selections. The premium ears at our cattle shows, by diverting attention from the true issues, has been an injury to corn growing. Whenever a society shall offer a premium for a distinct quality of seed, then improvement will become rapid. If a second committee were required after a first committee had awarded the premiums, to weigh each trace, shell its corn, calculate its proportions to waste in percentages, inquire into the yield and the fodder proportion, we think their full



report would teach very much that should be known, and it would be found that oftentimes the poorer corn for the farmer to grow has received the encouragement of a premium.

Seed corn—Its improvement at the foundation of the most successful growing of corn. Its principles of selection the same common sense principles which govern the most successful practices in all branches of farming. If we have wandered from common sense, therein we have erred, and are teaching error. If our statements appeal to your common sense, then give the principles a trial; and right or wrong, once recognizing the need of improvement, experience will correct errors, establish truths, and result in advantages which to state in the fullness of the possibilities, would now seem visionary.

In garden varieties of corn we find prolificacy quite general, and under 'proper cultivation two ears to a stalk seems more the rule than does one ear to the stalk in a field variety. This has been accomplished through the greater care exercised in selecting the seed, and by a more complete system of cultivation. There is room for further selection even here, as all who have studied a corn-field must know, yet so far superior is the prolificacy of garden corn that we may safely urge this accomplished fact as a standard towards which farmers should aspire. What gardeners have done the farmer should do, and he should be satisfied with no less.

In pop corn we have a variety dwarf in ear, and dwarf in stature, but under favorable circumstances its yield is equal to that of our larger field varieties. It has, however, the objection, that the husking of so many small ears as are required for a bushel, of product is slow and laborious. Yet it is prolific; more often are four or five or seven ears formed to a stalk than on other corn plants, and from this variety has seemingly been derived some of the kinds known as branching corn. The study of the history and habits of the pop corn is sufficient to convince that the same intelligence which has produced this corn, if used in the proper direction on field

corn, is capable in time of developing results which to our present knowledge would justly be deemed astounding.

What standard should be urged for the farmer to attain? This is a question very readily answered. Let each farmer improve his seed ever so little, and keep at it, and soon 200 bushels of shelled corn per acre, at harvest, will seem no more strange than 100 bushels does now. Fertilizer can be bought at any time without previous preparation; we can cultivate as seems to us best, but seed, good seed, satisfactory seed, is to be attained only by effort extending over considerable time, and an effort, which must ever be regulated by wise experiment of farmers who shall not have their faith destroyed by discouragement in partial failures, and through defeats shall study the way to victory. We have no satisfactory seed corn as yet; it remains to be furnished through the combined efforts of farmers who study and observe, and who in benefiting themselves by its production shall unconsciously become the benefiter of the race.

#### DISCUSSION.

QUESTION. What is your method of root pruning?

ANSWER. The cultivator is the best method I know of.

MR. HARRIS. I wish to ask you in regard to the application of superphosphate. I have had a little experience with it, with some things, but I wish to ask you in regard to its application to corn?

ANS. I think it to be a very good fertilizer, and I commonly apply it in the hill.

QUES. In selecting seed for planting, would you take all the seeds from that ear of corn on the table?

ANS. You ask a difficult question, very difficult indeed. Some authorities claim that the bottom is better, and some claim the exact opposite. I would advise you in selecting your seed corn, to go by the number of kernels in length.

MR. HARRIS of New York. Will you tell me why this variety (indicating) is better than this (indicating)?

ANS. I cannot ; I don't know the history of the corn at all, only the statement of the gentleman who left it with me ; this (indicating) being a 100-bushel crop, and this (indicating) a 45-bushel crop, to the acre. I have corn in my office, an ear, or rather the cob of an ear, which was the longest ear at the Centennial. The gentleman who gave me the cob wanted to plant the corn. I have it now in my office. It is  $14\frac{1}{4}$  inches in length. I have seen corn 14 inches, and a great deal which was 12 inches, but I have never seen corn over  $14\frac{1}{2}$  inches. I have heard of it 16 and 17 inches in length. Sometimes farmers come to me and tell me they have corn 16 and 17 inches in length ; I tell them I want to get it, but I never do. They never bring it in of that length.

QUES. What is your method of harvesting corn ?

ANS. I have all my harvesting done in the field by contract. It is husked in the field. Often I have quite a number at work, and in the afternoon I have a man who goes around and makes a record of the work of each, and by that means we have a record of the crop of each year.

QUES. What time do you cut it up ?

ANS. Rarely before September, say the 18th or 20th. If I could carry out my wish in every case I would not until the 20th of October.

QUES. Is your corn fodder left out until that time ?

ANS. Yes, sir.

QUES. I find if my corn fodder is left out late it is about worthless.

ANS. You did not understand me. I said I should like to leave it until October, but I usually get it about the 20th of September.

QUES. Which is the better way, to cultivate it in level row or hill it up with a horse-hoe ?

ANS. I prefer the level culture.

QUES. How would you apply your manure here in Maine ? as we do, a shovelful in a hill, or broadcast ?

ANS. I should put it on broadcast.

QUES. Would you prefer to apply the manure in five inch drills, or spread it ?



ANS. I wish to keep the manure as near the top as I can get it. And in my experience I don't use manure for corn, because I do not have enough. I prefer to use my manures for other things, and take fertilizers for my corn. I spread it on the surface and leave it; do not harrow it in.

QUES. What kind of soil do you plant to corn?

ANS. A gravelly, sandy loam. I can dig in some places ten inches and strike sand and gravel.

QUES. How deep does your corn usually run, ten inches?

ANS. Oh, yes, seven feet. I have found places where I could trace it down five feet, and I have pretty conclusive evidence that it goes even lower than that.

QUES. If your roots extend so low, why do you want your manure on the surface?

ANS. You have asked a hard question. I have an idea of my own in regard to it. I think roots have a double function, but I have no facts to prove my belief in that respect. It is simply my own idea upon the subject.

QUES. How long will dressing last upon such land?

ANS. I do not think there is any law in regard to the matter.

Mr. FARRINGTON. Is the land to which you have applied manure, in a natural state?

ANS. In the first place it was in a natural state. I took this land because I have a history of it for fifteen years. In other words, in the memory of my neighbors it had never received any manure.

QUES. What do you think, Doctor, of the practice of planting pumpkins and beans with your corn?

ANS. I don't believe in stolen crops, any way.

## METHODS OF RENOVATING OUR FARMS.

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BY HORACE BODWELL, ACTON.

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That the most of our farms, throughout the length and breadth of our State, have deteriorated from lack of good husbandry and sufficient labor, as well as from long cropping, without sufficient fertilizers to feed the crops and thereby exhausting the soil of its plant food, I have no good reason to doubt all farmers will agree; and that there are but few farms in our State, probably, that might not be yearly and completely fertilized and renovated by a regular method of manures, and such other fertilizers as may be found and produced upon the farm. On many farms may be found a low swamp filled with the wash of decayed leaves and mingled mass of rubbish, the accumulation of hundreds of years, containing the very elements which the soil has been exhausted, by long and continued croppings, and by digging and carting to the barn yards this mingled mass and composting it with the liquid manures of our stables, after exposing it to the air and sun during one season, will be converted (if not into gold) into a mine of wealth, and in a proper state to cart upon our long exhausted soil. In all of our stables where our horses, cattle and swine are kept, we might and should save, by a little care given their droppings, the ammonia from escaping, thereby saving one of the ingredients of the plant food. Droppings of our fowls, leached ashes, bones and the suds from your wash rooms, saved and rightly composted and carted upon our farms, go far toward reclaiming our impoverished soil from its long croppings. Cart sods and wash from the roadsides and leaves from the woods, dig up the rubbish under your walls in the fields and cart to the stables and compost with gypsum, and use lime if your com-

post contain many tough sods, always taking good care in composting that the fertilizing gasses do not escape. With this kind of husbandry, year by year, the grass crop will increase and your stables (if not needed to be enlarged) will be filled with the choicest kind of hay, and your stalls filled with cattle and sheep.

That sheep tend largely to improve and reclaim our exhausted lands, there can be no doubt; they not only clean it of all the running vines and bushes and other useless plants and weeds, but will leave it with the green grass springing up among the rocks and in every nook and corner; and if any part can be plowed, do not hesitate to do it, expecting a rich and bountiful harvest. There is no animal raised upon our farms that will do so much towards reclaiming and renovating the pasture land, or by which we can realize so much and ready profit as from the sheep. If we would improve our farms, in most cases we should feed to our stock all our hay, grain and vegetables, and thereby return to our farms a larger portion of the croppings again to the soil. Experience and observation has taught us that our farms not only require their yearly returns in manures and fertilizers for their yearly crops, but the care of the husbandman at all times.

The plow cannot be used too often prior to putting in the seed, and as soon as may be after the seed is up the cultivator should every few days be run through the corn and potato field, and the dryer the ground the oftener, until the plants are too large to admit of its working; and when we are deficient of manures to keep our fields in the proper state of cultivation, in the months of June and July, when the grass is green, plow under the grass on one or more acres as you have time and opportunity, and soon after go over the ground with the cultivator or harrow, but do not disturb the sward. The next season plow crosswise of the piece, then harrow and sow to oats, and when in the greenest state plow them under, taking care that none are left uncovered. The



next year plow lengthwise, harrow and cart on manure, plow crosswise and plant to corn, and if well cared for and a good season, depend upon and expect a good crop. After harvesting the corn, plow, harrow and level down the ground, and early in the spring sow on grass-seed, not forgetting to put a large supply of clover seed. If the ground is very dry run over once with the harrow, and you may expect a good crop of hay the last of July or the first of August, and for a number of years to come.

And here allow me to suggest a few points in regard to plowing, as we find them frequently given from different stand-points, as for instance: if we wish to pulverize and mingle the different parts of the soil, to destroy weeds, to cover up our manures; also to keep the top part of the soil open and fresh, and to cover the sward, much judgment is required, as we, as a whole, have different kinds of soils to deal with, therefore the plowing which will accomplish the desired end, may be considered the best. For the different varieties of seed, the plowing that will best pulverize and fit the ground to receive the seed and leaves nothing to retard its growth, may always be considered the best. Different kinds of crops will require the soil pulverized to different depths, and we find very few, that are not benefited by being broken and loosened quite deeply. Gardeners quite readily understand this part of the work, and hence they work the soil deeply and thoroughly, pulverizing it to the greatest extent. Now if farmers would adopt this principle of thoroughness, less failures would occur in their crops, both in grain and grass, and they would soon find less deterioration in their farms as well as their crops, to complain about, especially where due care is taken in selecting seed for planting and seeding down their grounds.

If we are to grow corn or wheat on our grounds, it is much less labor to grow one hundred bushels of corn or thirty of wheat on the acre, than to grow the same amount on two or more acres, aside from the actual profit, which is no small item with the farmer. Deep and shoal ploughing are only

relative terms, depending wholly upon the ground to be plowed. While some of our soils require to be plowed only three or four inches in depth, others may require from six to eight, ten and even twelve inches. All soils may be deepened, but this depends entirely upon good judgment, patience and much care. If we wish to deepen the surface soil we can do it gradually, by deepening it yearly with the plow, having due care not to turn all the best soil to the bottom of the furrow. The standing furrow usually provides the best way of mixing and deepening soils. Deep plowing and the deep working of the soil are two different operations, and are often confounded and often disgust the operator.

That the value of liquid manure has been overlooked from our animals by the larger class of our farmers, there can be no reasonable doubt. We have good reason to believe that a cow, under common feeding, produces yearly 20,000 pounds of solid excrements, and about 8,000 pounds of liquid. The difference in the value of the two is but slightly in favor of the solids.

The liquids dropped from our stock contain a large part of all the secretions of the body, which are capable of producing the rich nitrogenous compounds so essential as forcing or leaf-forming agents in the growth of plants. While the solids hold the phosphoric acid, the lime and magnesia, which go principally to seeds, the liquid furnishes the nitrogen, potash and soda necessary in forming the stalk and leaves; therefore, these two forms of the plant food should not be separated or allowed to go to waste; and by saving this liquid in the use of straw, forest leaves, or such other absorbents as may come to hand, will be nearly if not quite equal to the solid, thus doubling the farmer's manure pile yearly.

A keen eye will discover a great deal of rubbish, that will in a short time make a valuable compost and be in a suitable condition to cart to the field. The farmer, although generally very economical in his business transaction, is, I was about to say, if not the most profligate, the most negligent of all mankind in reference to saving manure; more farms have deteri-

orated, and their owners impoverished by neglecting to keep up the supply of manure which is within their own reach, and keeping down the bushes and shrubs, both in the fields and pastures, than from all other causes. Let us look for a moment at the successful farmer, for we, I am happy to say, have more or less in every town among us, that class of men whose keen eye and muscular arm, (as the political orator terms it, when addressing that class of men on great and momentous issues of the times—and these are thick and often when their bread and butter are at stake), not only secures all the muck along the creeks and bogs, the mouldy grass in the swales and by the road-side, and the liquid manure running under the stables, but sows broadcast over his fields not only the materials already named, but all kinds of refuse accumulating around and about his buildings, and with the plowshare covers them deep in the soil to moulder and return to their first state and enrich the soil for future crops.

Every farmer should rely mainly upon his stock for manure. Cattle and horses should be stalled or yarded by night upon the refuse hay, straw, forest leaves, and fine dried loam or muck. Sheep and hogs should be kept on every farm. Accretions to the manure pile may be made from various sources, including all decaying vegetable and animal matter, waste and wash from the kitchen, muck from the swamps, and leaves from the forest. That there are a great many special fertilizers in the different sections of our State, and in ample amount for a continual supply of all the yearly drain upon the resources of our farms, we have no good reason to doubt. The coast line from Kittery in the county of York, to Eastport in Washington county, including all the inlets, bays and estuaries, has an aggregate extent of hundreds of miles, and every mile abounds with and can furnish stores of fish, sea-weed and mussel-bed, for the manuring of all the fields along the coast of our State; lime is also plenty and cheap in the tide-water region.

Now, gentlemen, I do not wish to be understood, that after taking all the pains and care possible to save all the mass of



waste about our farms and applying it to our soil, unless we have first prepared and put it in proper condition to receive the manure; for it is presumed no good farmer would for a moment think of putting his manure upon his soil saturated and full of water, that the roots will not take it up, to lay in a dormant and useless state. Every farmer can in a large measure control the condition of his soil, and this he must do before applying his plant food, or he is sure to make a failure in his crops, whether it be grain or grass. Now, if the soil on which we are to cart our manure be a sandy loam, we have only to put on our teams, and plow and harrow, and take off the stones, and then apply the plant food broadcast, well pulverized, and a small quantity in the drill, when it is ready to receive the seed, and with good care your crop in most cases is assured. If your soil be wet, and so saturated with water that the roots cannot take up the plant food, first drain and bed up your land before applying the plant food, when the sun and air will soon do their part of the work, and the land will soon be ready to receive the plant food and seed.

It is an established fact, that the soil is composed of organic matter, or at least the soil furnishes through its agency, potash, nitrogen, phosphoric acid, lime, soda, magnesia, silica, (sand) sulphuric acid, carbonic acid, oxide of iron, chlorine, and alumina, in all twelve; from the first eleven plants are grown, (or known as plant food.) Now if we yearly grow crops upon our soils without regard to the food that grows them, and sell a part or all of them without making due return of the elements of the crops, we shall as assuredly impoverish our soils just in proportion as we neglect to return the food taken up by the crop, and our crops will decrease year by year both in quality and quantity, until the exhaustion of the soil becomes complete. Prof. Stockbridge tells us that by investigation it has been found that the larger portion of soils, although well supplied by the nine last substances, and that we need not very much concern ourselves about them, that the most of soils by excessive croppings, have been exhausted of their nitrogen, potash and phosphoric

acid, which they must have in order to mature perfect crops to pay for cultivation; although it is known that the bulk of crops (ninety-five to ninety-nine per cent.) comes from the air. Nitrogen we have from sulphate ammonia, Peruvian guano, common saltpetre, nitrate soda and fish guano; potash from muriate potash, sulphate potash, wood ashes, common saltpetre and carbonate potash, and phosphoric acid from dissolved bones, dissolved bone black, dissolved burnt bone, dissolved South Carolina rock and dissolved Canadian apatite. Experience and observation teaches us that if we wish to keep up our farm to a paying standard and to its virgin state, and grow good paying crops, we must return to it full interest in the elements composing the plant food, and the richer the elements the better; you need have no fear in this direction, for plants seldom if ever take any more than they require, while they do require all the elements essential to their growth.

From a statement made by Samuel L. Dana, after a careful and elaborate experiment: It appears that an average cow, kept on a daily feed of 24 lbs. of hay and 12½ lbs. of potatoes, will yield, in addition to her liquid evacuation, over 31,000 lbs. of solid manure per year, containing 180 lbs. of ammonia, which, with other included chemical elements, amounts in value to more than \$40. And, by the same authority it also appears, that the liquid manure amounts to over 7,000 lbs. per year, surpassing the solid manure in value in the ratio of more than two to one, making the value of the manure more than the entire cost of feeding. He further says, that 100 lbs. of cattle urine affords about 8 lbs. of the most powerful salts ever used by farmers; this is equivalent to about 600 lbs. per year of the salts referred to for each animal.

In the estimation by Prof. Johnson, one ton of clover contains potash, phosphoric acid and nitrogen, sufficient to make it worth \$17.57 for manures, while one ton of bran or peas is worth by the same standard over \$22.00, while some other feeds have still a higher manural value. In the foregoing



experiments of Mr. Dana, the daily feed of hay was equivalent to four and a half tons of hay yearly. Now, if the feed had been clover instead of hay, the manural value per year would have been more than \$72.00, according to Prof. Johnson's theory. These conclusions are both from the results, as you readily perceive, of practical and chemical investigation, and are confirmed by practical and successful farmers.

Josiah Quincy, Jr., says he has found that a good cow, when fed on the soiling system, yields  $3\frac{1}{2}$  cords of manure per year, and by the addition of muck may be more than doubled, both in quantity and value; and that the liquid manure when absorbed with muck is still worth more than the solid, making some 15 cords worth from \$5 to \$8 per cord. Now, from this it appears that the manure is equivalent in value to the milk.

And now a word about the pigs, from Joseph Harris of New York; who knows, perhaps, as much about manures and pigs as the most of farmers. He estimates that he received forty-one and three-fourth cents' worth of manure per week from pigs that were fed at a cost of thirty-seven and a half cents' per week.

Now, let me say right here, in order to reclaim and renovate our farms in Maine, we want and must have more scientific farming; and here do not let me be understood to mean by scientific farming something taught only in books, theoretical in a large degree; I do not mean any such thing. But I do mean to say, that every farmer who is skilled in farming, men who at all times keep their farms in good condition, keep good fences, plow and cultivate their ground at proper seasons of the year, sow and plant at the right time, and have proper care for everything about the farm, and see that nothing goes to waste, and makes everything count for plant food, all such men as these may be termed practical and scientific farmers; and you will find such men in all localities throughout the length and breadth of the State. Do you ask, then, how about our young men who graduate at our Agricultural Colleges, as professors of this science? If they graduate



without a practical knowledge of farming, they are not scientific farmers, although they may claim the title as such. Where is the man that will say he knows that certain fertilizers applied to certain crops is likely to increase that crop, whether it be grain or grass, until he has had a practical knowledge of the matter?

The young man who has been through his course of studies and graduated, and has learned in his course of studies that by applying certain fertilizers to the soil will produce satisfactory result, does not show he is a scientific farmer, neither will he presume to say that he cannot do anything more.

Now, the man who has applied his ashes to certain crops for a term of years, and omitting to put it on a part during a part of the time to ascertain the result, if he finds that where the ashes are not applied the crops are less, he has learned by practical farming that the ashes are beneficial, and he is a scientific farmer as far as he has tested the ash. Now then, if he becomes an expert in all the branches of farming by learning from books and papers, or whatever source, and ascertains the facts by practical tests, he has the best diploma that can be had, and may be deemed a scientific farmer in the full sense of the word. The young man attending the Agricultural College, and after studying agricultural chemistry a specified time, and only occasionally visiting the farm to see the growing crops, will come far short of a scientific farmer, for he lacks the practical training, with his own labor. Nevertheless, what he learns at the college in theory will be of great and lasting advantage to him all through his lifetime.

That our prosperity as a country does in a great part, if not wholly, depend upon our agricultural interests, no one, I presume, will doubt. That very much in proportion as this great branch of industry is intelligently managed, we may reasonably expect advancement in prosperity and wealth; neither are we to achieve the desired end by appropriating our farms entirely to one species of farming. If we raise corn or wheat for export, this will of course be our principal

industry. Nevertheless, we should not let this be to the exclusion of such other farm crops as are indispensable for our daily consumption, and by a well managed system of mixed husbandry upon our farms, we shall be able to have a sufficient surplus to pay for all of our groceries, thereby stopping a great leak and waste upon our farms yearly, leaving us a yearly surplus to replenish our soil with the plant-food already gone for the growth and maturity of the past crops taken from the farm, thus leaving the soil in a better condition for the succeeding crops.

And now in closing my remarks, I can only say by way of illustration, that it is study and practice that constitutes the eminent statesman, as also the lawyer, physician, merchant, manufacturer and ship-master. And here let me say, it is not for the want of brains that the farmer is a whit behind the literary man, or that he is not as keen and far-seeing as any other class of men in the community, but a lack on his own account of not reading himself up on his own profession, and other matters he has to do and contend with, and that, too, without any reasonable excuse on his part, for there is no lack of reading matter at this time in our profession, as well as in other professions of the day. And the farmer has, or should have, his time for his daily labor with his hands limited as a general thing in his farm work, to ten hours per day, and leaving at least from two to four hours daily in reading up his profession, leaving a good and sufficient margin for sleep, and from ten to twelve hours per day sufficient for all practical purposes.

## WINTER MANAGEMENT OF NEAT STOCK.

BY COLUMBUS HAYFORD, MAYSVILLE.

When God created the universe, He gave man dominion over all the cattle which He had made. In His infinite wisdom He so constructed the soil of the earth that with the aid of the husbandman it might bring forth food for the support of man and beast. In our northern climate, where the winters are so long and so severe, we are obliged to furnish shelter and much food for the support of our stock, at least six months of the year. It has been fully proved that animals fed upon one kind of food alone for any length of time, will not do well. To have healthy and well-developed animals it is necessary to have a variety of food. The seed time is the time to prepare the winter food for our stock. The root crop should be made a specialty. At least one acre of land to every ten head of cattle should be devoted to this purpose. No farmer can afford to raise young stock or keep milch cows without a good supply of roots. My experience is that turnip and potato crops are the most profitable. Then follows the grass crop, which should be secured while it is grass and not hay seed.

I am satisfied that a ton of hay secured on the first days of July, fed to dairy cows, has a higher value by several dollars than an equal amount secured three weeks later. Large quantities of grain are fed with hay. If the entire hay crop of the State could be secured at the best possible time, its value when fed would exceed the worth of hay now obtained, together with the grain raised in the State and fed in connection with hay. Stock should not be kept to kill brier bushes and thistles in summer, and convert straw and ripe hay into manure in winter, but kept for profit. And this comes only



by good breeding and good care the year round. After the above named crops are secured, comes the winter management of stock. The same rule applies in stock as in all kinds of business. If it pays for keeping at all, it pays for being well kept. When a man commences the winter right with his stock and keeps doing for them, they come out looking well in the spring. My practice is to commence feeding in October. I feed the best I have to all kinds of stock when they first come to the barn. The change from green to dry feed is so great that they need good feed and good care, especially the young, growing stock. Here is where a great amount of money is annually lost.

My method of feeding is as follows: After milking is finished I give a feed of nice hay and let them remain quiet till noon; then water; then another feed of hay or straw, as they will then eat the coarsest food best. Let them remain quiet for five hours, then feed with hay, followed by meal or roots, which is the last feed for the night. The mangers should be cleaned every day. The stable should be cleaned twice a day at least. Salt should be kept where stock can get it when they desire. Air, light, and exercise are very essential, but not too much of the former. Prepare some good, light, comfortable barns for the stock, and keep them warm. Lumber is very much cheaper in Maine than fodder. Hence the need of making our barns warmer to save feed. I think it pays to line our stables all around inside so that the animal heat from the stock will prevent freezing, even in the coldest weather. This is consistent with the best ventilation. Our barns should be built forty-five feet wide. This will give eighteen feet for a bay, twelve feet for driveway, and fifteen feet for stable; a platform four feet, six inches long, for large cows, two inches shorter for smaller ones, a drop of six inches, a trench sixteen inches wide, and a walk elevated four inches, with plenty of straw, sawdust, or dry muck, and nearly all, both of liquid and solid manure can be saved, and you will have pure air, sweet milk and a clean stable. How many there are who keep their stock in cold barns during the

winter, and if they survive the cold weather they will not get their old coats off till the middle of the summer, and it will take the remainder of the season to get to thriving.

#### DISCUSSION.

Mr. REYNOLDS of Oxford County. The past winter I commenced feeding stock on the Herdsdale farm in Canton, on the 10th of December. There are forty-six head of cattle: fifteen thoroughbred Jerseys, three Ashland grade Jerseys, and sixteen Shorthorns, besides twelve of another kind. My manner of feeding is, first, to give them the poorest kind of hay; next, meadow hay, then shorts and a little ground corn, rye, oats and wheat, mixed. They have had about two quarts of bran, and a pound of wheat, rye and oats. After they have eaten this provender, they have a little foddering of good hay. They remain in the barn until ten o'clock, if pleasant. They are then turned out, and stay out until two or three o'clock in the afternoon. If it is cold they are allowed to drink, and are tied up at once, and are not fed until two o'clock. They receive the last foddering about nine o'clock in the morning, and then they are fed with meadow hay, or a mixture; it is better than ordinary meadow hay. They receive every day a mixture of beets and turnips, cut with a root cutter. I give each one as much as I can take on a shovel. They have three good meals a day, regularly; and my stock has been gaining all winter.

Mr. NELSON of Kennebec County. A great many of us farmers find ourselves abounding in meadow hay, straw, etc., and there is much difference between that kind of feed and good hay. The question naturally arises, How can we best use this poor feed? I am of the opinion that in feeding such fodder as the average farmer will have to do half of the winter, and I may say three-fourths, the root crop is invaluable to him. Roots fed with this coarse fodder have been worth more than the same value in grain, in my experience; worth very much more with such fodder than with early cut English hay. Were I in possession of enough nice hay to feed,

I would prefer grain ; but with the coarser fodder, roots are absolutely invaluable. But the feed being what it may, a warm barn is necessary, and I may say indispensable. No stock can be carried through the winter successfully in a barn with the winds howling through it, and the snow sifting over the stock. As to turning cattle out, I think they are better out of the barn three or four hours a day, when the day is warm. But I have come to the conclusion that when the barn is warmer than the weather outside, the barn is the best place for the cattle.

The difference between keeping young stock and cows giving milk is very material. To winter cows on coarse feed and derive an income from them for milk, is out of the question. The question at present in regard to the dairying interests of Maine, is whether early cut hay is the feed for cows. There is one root of which the value as feed is underestimated, and that is the strap leaf turnip. They can be raised easily in large quantities, at a very moderate expense, and for early feed they are excellent. Mr. Hayford tells us he begins to feed his cattle in October. I think stock should be fed from the time feed begins to dry up in the pastures. By so doing nothing is lost and much gained. I would rather have the flat turnip than any other root. It is fit for an animal to eat. The ruta бага is fit for neither man nor animal in December. I would as soon think of placing a dish of russet apples before you, Mr. President, as those turnips before cows in December. But take them in March and they are ripe and ready to be eaten. The purple top turnip can be raised at half the expense of the English. I have raised them, and I think they are worth more, but I do not mean to say that they are as valuable at certain times as other varieties. I am feeding my cows more, yes, perhaps three times as much as Mr. Reynolds feeds his cows. I generally water them right after milking. I give them very nearly a peck of roots to each cow, a day. I have much straw and corn fodder which I feed to them. So far as my



own personal experience goes, I would feed but twice a day, grain or roots.

Mr. ROBINSON. I used to turn my cattle out in the morning, and throw out some straw, and let them stay out during the day. We had no milk in the winter then. We make butter at our house now, and have good looking cattle. I give them fair hay and plenty of it, and they drink heartily. I mix two quarts of shorts with hot water, then turn in cold water and give to each cow that gives milk. I keep them in the barn now in cold weather, and I find that my cattle grow well, and I also find that it is not impossible to make butter in the winter. In regard to feeding roots: some say there is a taste of the roots in the butter. I think no unpleasant taste will be discovered unless cows get at the tops of turnips.

Mr. FARRINGTON of Orono. It seems to me that one of the most important questions in connection with keeping stock, is that they shall be kept warm. If allowed to stay in a barn which is not so warm as it ought to be, they should be kept warm with food. One of the essentials of a barn is, that it should be frost proof, and it is not a very difficult matter to make it so. If your barn is so close that it does not freeze inside, there is another thing that is essential, and that is good ventilation. Perhaps just here the query may come up, How shall I ventilate my barn, and at the same time keep it warm? The answer to it is simple. I will give the method of ventilation adopted at Orono; it is simple and cheap:—There is a large cellar under the barn into which all the manure the cattle make is thrown; and we have about forty head of cattle there. If there were no ventilation, there would be odors from the cellar which would naturally be injurious to the stock; to carry off these odors there are provided on each side four tubes which go from the cellar to the eaves of the barn. They are made from simple hemlock boards. The tubes are nearly four feet in width and one foot deep, and through the center of each there is a partition. So each tube is divided into two parts, for the air to go down one and up the other. On one side the air is coming down,

and at the same time going up on the other. Frequently, after we introduced this method of ventilation, visitors, coming to see the barn, would exclaim, "How pure your cellars are! How do you manage to keep the air so good? Your cattle seem to be healthy and well." We would answer, "Look at our mode of ventilation." After examining, some would say, "I can fix one of those tubes in my barn. They are easily enough built." It is a fact which I may mention here, that any young man taking a college course at the State College, no matter how little he may care for farming matters, will get some hints that are profitable to him during his whole life. I thought I would present this idea, hoping if any of you are troubled by poor ventilation, you will adopt this plan. I say next after warmth let us have ventilation, and some system after the pattern I have suggested is much better than open doors and windows, because there is never a current of cold air striking your cattle, and you can keep the temperature just where you want it. About feeding, we don't feed scalded meal. We don't think it is any better. We have tried the experiment of feeding swine on raw and cooked meal, and continued it for eight years, and in every case the pigs have done better on raw than on cooked meal. About feeding turnips to cows, I don't know of a case where they have affected the taste of the milk, unless the tops were eaten.

Dr. LINCOLN. In Washington County, we feed much of our straw to our sheep, oat and barley straw mostly. I find they do well on it. I also feed much fish pomace. I think it is better than most kinds of hay. It is good for young stock also. We have tried it thoroughly. We have turned it in the stalls of some cattle and they would keep in good condition. I think some young cattle which I have known have kept as fat on that as on English hay and grain. Those who have had considerable experience in the matter tell me, and my own experience has been the same, that it is as good as corn, pound for pound. It also makes good manure. In a flock of sheep I had last spring, every one was good mutton,



and all they had all winter was bog hay and fish pomace. I do not mean porgy chum, but herring pomace; and it is well eaten by cattle if educated to it. On the island, a man told me that he hauled raw herrings, and they were all he gave his sheep to eat during the winter. My sheep have not had a particle of English hay in three or four years.

The CHAIRMAN. In regard to straw, one gentleman said he thought it was not worth much. I have given mine to my horses for the last six or eight years. That is all they have besides grain, and they keep in very good order. I would much rather have oat straw than poor English hay.

Mr. FLINT. I think it makes little difference what time of the day you feed sheep, if you are only regular. Generally, the farmers my way feed them about twice a day, all they will eat. It is sometimes cheaper to use straw and make it up with grain. I also believe in roots. One of the most important subjects for farmers in Maine is raising roots.

Mr. HILL. I am not much of a man to talk, but I will give you my mode of procedure. I have a barn one hundred feet long and forty-five feet wide. There is a small shed on one end. From the time the cattle go into the barn in the fall, until spring, they do not go out. It is well ventilated. They go down into the cellar and drink. As soon as they are turned out into the cellar, I feed them and bed them with straw. I use sugar beets or shorts, three or four quarts a day, for the cows. The Wellman Sugar beet I consider the best and cheapest root I have ever seen. My tie-up is fifteen feet wide, and we have ample room to give them good bedding. We make quite a large quantity of manure. We generally use one hundred and fifty loads of muck which goes into the cellar with the other manure. It is scraped back and drops down into the cellar, where we keep a number of hogs to work it over. If you do not keep hogs to work on it, it will sometimes ferment almost enough to set the barn on fire.

Mr. GOWELL. I have been feeding cows and cattle generally for six years, perhaps a little heavily lately. I have



been giving two quarts, to a peck of shorts. I have been in the habit of giving grain the year round. I feed hay three times a day, and only three, but my cows have all they will eat. Now I wish to ask whether I am feeding too much hay. I am feeding nearly thirty pounds per day. I try to keep my stock warm, and have good ventilation.

Mr. FARRINGTON. If I was in my neighbor's condition, I would do this: I would note carefully for a week, at least, the amount of milk I got from my cows. The next week I would reduce the amount of hay I was feeding them and watch the effect. The next week I would reduce still more, until I had brought it down to the lowest point, and bear the result in mind. I would answer that question from my own experience, and I don't know how a true answer can be obtained except in that way. We regard a water-tight tank of high importance in saving manure.

Dr. LINCOLN. The barn on my farm is fifty feet square, the eaves overhanging considerable. The floor is concave, and the bottom of my tank is made of blue clay. We haul in muck and make a heap upon the floor, and in hauling it out in March we thoroughly mix it with liquid manure. This tank was cemented twenty-five or thirty years ago, and it is perfectly solid as yet.

Mr. BURLEIGH. This is a subject that interests me. I used to be in the milk business to a considerable extent. One winter I kept thirty milch cows. As regards feeding, I will give you my views: I always feed more or less bran or meal. I use considerable oat-meal. I give cows a little of some kind of grain every day. The first thing in the morning is to get this provender, and after that the hay is given. We feed them with hay three times a day. Speaking of straw, I remember the remark of an old man who was a prominent cattle raiser in Somerset county. He said his cattle were always fed well, and he kept them on straw, but they were not fed with it. I think we might raise good cattle on straw, but in my estimation it is better to feed them on good early

cut hay. I think our hay crop amounts to one million five hundred thousand tons annually, and we get our hay much better than we used to. I would rather have my hay cut before the first blow; it is worth four dollars a ton more than it is after heading, for me. I think it is safe to say, that a ton cut before it enters the bloom is worth much more than it is cut later; it is as good as a ton cut late, and five bushels of meal. One brother asked me about growing beef: I find by using this early cut hay and six or eight pounds of meal a day, I can grow my steers; just give them all the hay they want to eat. In the year 1871, the grasshopper year, I had a large stock, and I got along well with them, very well indeed. I found myself with a barn full of cattle; I had a lot of steers; there were three of them that I could have sold for twenty dollars apiece in the fall. Well, I fed them hay at the rate of eight pounds to a steer, each day. I give my cows twelve pounds. I gave the steers six pounds of corn and oats mixed, perhaps a little more. Well, in the month of April, or perhaps in May, I was offered for those steers one hundred and three dollars apiece. I do not think I have fed any milch cows that ever paid better than those steers. I was born and brought up on a farm, and I never breed cattle and grow them but I get my pay. In regard to feeding meal, I prefer dry meal for my cattle. Keep your cattle warm; have regular hours for feeding, and never disturb them before light or after dark.

Dr. NORTH. In this matter of feeding cattle in the winter, I think the question of economy should be taken into consideration. In some cases it seems as though it took about all the time to feed. For instance, some farmers feed two and three, perhaps twice at noon, and at night three or four times. Now, I think this is simply a waste of time, and I do not think it benefits the stock. I do not think it advisable for a farmer to pursue this plan. My cattle are fed three good meals a day, and we so plan our work as to save all we can. The first thing given to them is grain; and I think cattle will make better use of it if given to them dry. I never



fed roots very extensively, as I never had much success in raising them, but I think they are good. We consider that they make animals more healthy, but are not of equal benefit for making butter. We always aim to keep our cattle as warm as possible. The top of our barn is so arranged that there is plenty of ventilation. I am glad of the plan offered for feeding some straw. I had a Jersey cow that had nothing but straw to within a few weeks of her coming in, and she kept in good condition. As I said before, my cattle are fed all they can eat at regular times. They are looking well, and we are making about twenty-five pounds of butter a week, from four cows. Of grain, I have fed meal and shorts in the first part of the winter; we have changed to meal and oats. We have fed meal and cotton-seed meal some, a quart to a cow. I am satisfied the cotton-seed meal is a very valuable feed, and the increase of butter is sufficient to pay a farmer for feeding it, and the manure is very much more valuable. A man at our Dairyman's Association at Newport, in 1876, said that when he fed cotton-seed meal it gave him in milk enough more than its cost to pay fifty cents a day on eight cows, and I am satisfied that he was correct. I never knew any bad results from feeding it. We always commence our winter feed by the first of November. I do not believe in feeding for one thing and expecting another. The best plan is to feed a butter making cow such material as will enable the cow to make butter.

Mr. BURLEIGH. I think we ought to wait until cows reach maturity before giving them much rich food.

Mr. HARRIS. My experience has been that it is not a good practice, and hardly safe, for me to feed my young cows largely of this highly concentrated food. I would like to ask Dr. North's mode of treating his young cows at the time of their calving, and when they begin to give milk.

Dr. NORTH. For the first twenty-four hours I feed a small quantity of hay, giving them warm water with shorts for a drink. On the succeeding days I increase their food as I



think they gain in strength. I have never had any trouble with my cattle.

Mr. NELSON. In reply to Mr. Gowell, I will say: I have a neighbor who is milking a number of cows. A year ago last fall he got the idea that he was feeding too much. He was feeding eight pounds at a feed, three times a day. The hay he has is not of the best quality. His farm is wet, almost a swale. He has reduced the amount of feed, and now he feeds just sixteen pounds a day by weight.

Mr. WADLIN. In relation to giving meal wet or dry, I do not believe in wetting it. A neighbor of mine fed wet and dry meal alternately for four weeks, proving conclusively that he got more milk when he fed meal dry. I water my cattle twice a day. If a cow is allowed to drink but once she may drink too much. I do not let mine drink so much in the morning as later. I came to the conclusion some time ago to feed but three times a day. I feed two quarts of meal and two or three of shorts. I think more depends upon good early cut hay, than is usually attributed to it.

## PERMANENT PASTURES AND THEIR MAINTENANCE.

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BY H. L. LELAND, SANGERVILLE.

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The raising and feeding of stock in its several branches, is the basis of profitable farming in Maine. The essential factor in profitable stock husbandry is a plentiful supply of grass, a generous growth in the field to cut, cure and store for winter food, and in the pasture an equally abundant yield of sweet, nutritious feed for the sustenance and growth of the animals grazing there. The average farmers of Maine receive more net income from summer pasturage—in the growth of young animals, in dairy products, in beef and mutton—than from any other source; and yet the pastures are the most neglected and sadly abused portion of the farm.

The term "permanent pasture," in Piscataquis county, is understood to apply only to lands inaccessible to the plow. Lands so completely paved with stone, that the sheep grazing them need to have their noses sharpened to get at the feed growing in the crevices; wet lands, not quite wet enough to be profitably used for the production of dainty tit-bits for the elite of Parisian life, yet wet enough to be resonant with music or croaking in early spring, and still dry enough in midsummer to grow rushes and coarse water grasses, to rasp out the throats, and fill the bellies of the hungry animals compelled to graze them. In addition to these wet, broken and rocky lands, it may also include large areas of naturally fertile and easily tilled soils. These soils have, from a series of years of cropping, with no return of fertilizers, been robbed of their vitality till they would no longer pay the cost of cultivation, and are now turned out to the renovating agencies of nature and neglect, and used as ranging ground

for stock. That animals grazing these exhausted lands can make profitable returns in growth, milk, or wool, is not to be expected.

The phrase, "a fine, rich old pasture," so suggestive in several of the States of tender steak, juicy mutton, rich cheese and golden butter, rarely enters into the Maine farmer's vocabulary. The factors essential in the make up of a pasture of this character, are a good soil, adapted to the growth of grass; time to establish a thick, dense turf, made up of a great number of varieties; means taken to eradicate all useless growth and pernicious weeds, that interfere with the grasses, and the application, from time to time, of such fertilizers as are needed to keep up and increase the fertility of the soil. The Maine farmer, from the habits of long custom, has become so strongly wedded to the use of the plow on all lands arable, that it will require a deal of evidence to convince him of the economy and advantage of the "let alone" or rather "not to plow" practice in the improvement and renovation of pastures.

My province is not to enter into a discussion of the merits of the plow in renovating pastures, yet, for the purpose of comparison, I will briefly point out some of the objections that may be presented against the use of the plow, in the management and improvement of pasture lands: First, the cost of frequently plowing and re-seeding are items of no inconsiderable amount. Second, our best grazing lands are usually situated upon high ridges and along the slopes of hills. The former when brought into tillage, being stripped of the protecting grass sod are made thin and unproductive, by having the fine particles of the soil blown away during the high winds of late fall and early spring; while the soil from the hill-side, broken by the plow, during every summer shower is being brought down to fill up the lower lands, till in time all the soil available for plant growth has been removed, and barrenness follows. Third, the enhanced cost for fencing in the division and subdivision of lands that are used, a part of the time in tillage, and a part of the time in



pasturage. Fourth, in restocking lands to grass, red clover and herds-grass are the only varieties in general use, neither of which is well adapted to grazing. Red clover is a biennial plant, and disappears at the close of the second season; herds-grass, the most valuable variety we have for hay, is entirely unsuited for a pasture grass, as it is quickly destroyed by close feeding. Fifth, on lands however fertile and well cared for, it requires several years for the varieties of grasses most valuable for pasturage to become firmly established, forming a close, thick-set turf, filled with a large number of varieties of grasses which will produce a uniform growth of sweet, nutritious feed, peculiarly acceptable to the stock fed upon them. Land devoted to pasturage, which may by proper treatment be brought up to this condition and kept permanently productive, ought not to be disturbed by the plow.

The direct advantages claimed in keeping pastures permanently in grass, in the best farmed sections of New York, Vermont and Connecticut, are, first, pastures kept permanently in grass contain a large number of varieties, which differ in their season of growth and maturity, thus producing a constant and uniform yield of fresh feed throughout the season. Second, experience has taught them that old pastures make more growth in young stock, cows fed upon them yield richer milk, and beef animals take on flesh and fat more rapidly than in pastures recently re-seeded. Third, on these old, permanent pastures the grass starts earlier in the spring, suffers less from summer drought, and continues growing and luxuriant later in the fall. Fourth, it requires less labor and outlay for fertilizers, to keep the pasture permanently in grass than to frequently plow, manure, and re-seed.

If, after careful consideration we are led to adopt as a general rule of practice, not to interfere with the grasses already growing in our pastures, then we are ready for the second part of the topic, viz: ways and means for their renovation and improvement. What to do with the pastures we now have, how to restore them to other uses or renovate them for pasturage, are questions vital to the farming interests of

Maine. In getting at the "what to do," or not to do, let each farmer make a thorough study of his own soil, its fertility, its adaptation for different purposes, its location, and such other factors as are essential to the fullest knowledge of its capabilities. When this careful study has been given, many of us will find it necessary to make a new map of the farm. We shall find that instead of using the thin soil located upon high hills, broken, rocky lands along the water-courses, and sterile plains, for pasturage, other and better lands will be occupied, and these now comparatively waste places will be set apart for the growth of wood and timber. When these high hills and sandy plains are again re-clothed with forest growth, they will shelter the home, the garden, the orchard and field from the blighting effects of the drying winds of summer, and the rude, piercing blasts of winter. Having disposed of these waste lands to the best advantage, set apart for pastures lands convenient and accessible to the buildings, and adapted to the growth of as large a number of varieties of grasses as is consistent with the other interests of the farm, the next important step is to enclose the pasture with a substantial fence. Let the rule be to fence the stock in and not out; by so-doing all road and interior fences not needed about the pasture can be dispensed with. Unnecessary fences not only cost largely to build and keep in repair, but occupy good land and greatly disfigure and mar the beauty of the scenery.

Do not ask nor expect your stock, and especially your milch cows, to get all their feed from the pasture from early spring till late fall, or not till your pasture is made vastly more productive than the average pastures of Maine. Prepare some forage crop for soiling during the drought of late summer or early fall. This fed out upon the pasture will be one means for their improvement.

Having selected the lands to be used for pasturage, the first work to be done in their renovation is to remove the bushes and noxious weeds that infest them, and give the grasses a chance to grow. My experience teaches me that



the most effective way to route these intruders is by a thorough cutting. Cedar, spruce, fir and juniper, have taken nearly full possession of many pastures. The time to wage an effectual warfare upon these pests is late in the fall or early in the winter, when the earth is hard frozen. A single blow of the axe at this time will dispatch a bush of considerable size. Briers, brakes and thistles can be kept in check, or often permanently eradicated by mowing annually, or oftener if need be. Buttercups are quickly got out of the way by introducing sheep into a pasture troubled with them. There can hardly be too much said in favor of the practice of grazing mixed stock in the same pasture. In my experience, into a pasture that will carry ten cows may be introduced ten sheep, and the cows will continue to be fed as well as before, and the sheep will quickly become ripe for the butcher, and most tempting bait for the half starved canine race. Pastures grazed by mixed stock are fed off uniformly. A great number of grasses and weeds rejected by neat stock and horses, are greedily eaten by sheep. Many coarse grasses and weeds are thus destroyed and their places filled by finer and more nutritious grasses, thus constantly improving the productiveness of the pasture. Besides, while at pasture much of the feed becomes soiled by being trampled upon, and becomes distasteful and is rejected. When mixed stock are pastured together this loss is largely avoided, as one class of animals will eat that rejected by the other.

Having cleared the pasture of bushes and weeds, and given the grasses a chance to get at the soil, and to receive the full benefit of the rain and sun, we have gained a point, but the field is not yet won. We need not expect that grass will grow luxuriantly on soils exhausted by years of cropping. Measures must be taken to restore productiveness to the soil. A compost of yard manure put on as a top-dressing would rarely ever fail of good results on most soils. The difficulty is, that after enriching the fields in tillage, the garden and orchard, there is none left for the pasture.

For lack of a fall supply of manure from home resources



we are obliged to resort to special fertilizers. Plaster on some soils, not on all, proves an excellent fertilizer. It ought to be thoroughly tried on different soils, and when found to act beneficially it is a cheap and available fertilizer. Pasture lands in Worcester county, Mass., are kept permanently productive by an annual application of one or two hundred pounds of plaster, spread on just as the grass is starting into growth in the spring. Potash is one of the most essential elements of plant food, and is one of which the soil is likely to become soonest exhausted. Wood ashes is the most available source of supplying potash to the soil. The farmers of Maine are culpably negligent of their best interests, in allowing ship loads of this most precious fertilizer carried away from their farms to enrich the soils of Long Island and New Jersey.

In Piscataquis county, and the same is true probably in all the older sections of the State, milch cows and growing animals need a more liberal supply of phosphate of lime for the formation of bone and the production of milk. This need of bone material is indicated by a desire to chew bones, leather, rotten wood, and the like. The lack of phosphate of lime is generally greatest on lands long used as pasturage for dairy cows, caused not only by the large supply demanded for the growth of bone, but from having been drawn out of the soil in the milk, of which it forms quite a large per cent. of its solid matter.

Other means for the permanent improvement of pastures, to which attention might profitably be given, are draining wet lands, removing stone that encumbers the surface of the soil, sowing a variety of grass seeds upon bare knolls, keeping the stock constantly upon the pasture during the grazing season, and knocking to pieces and spreading the droppings of the stock while at pasture. All these, and such other means as are at his command, will not be neglected by the diligent farmer, but will be taken advantage of for the purpose of constantly increasing the productiveness of his pastures, thereby adding to his profits in the increased yield of

his dairy cows, the growth and increase of his flocks and young stock.

Whether pastures should be close fed or not, is a question still debatable. My experience teaches it to be far the most preferable to feed quite close. Pastures thus fed not only carry more stock, but continue to improve in productiveness from year to year, becoming well filled with a variety of fine, sweet, nutritious grasses; while those allowed to run up and mature their seed, become thin, coarse grasses and weeds crowding out the finer and more nutritious sorts.

All observing farmers agree that the pastures of Maine demand prompt and immediate attention. The best methods to pursue in their renovation may differ with a difference in soil, &c. In nearly all cases of unproductiveness, it will be found that indispensable elements of plant food have been exhausted and must be restored. A close observation of the results of carefully conducted experiments with different fertilizers will teach each farmer what particular elements of plant food are most beneficial on his soil, and in what form he may most economically restore them. The grass crop is the most valuable product of Maine. All means judiciously employed to increase the fertility of the fields and pastures, and add to their productiveness is to make progress in the right direction.

#### DISCUSSION.

Mr. GILBERT. I know some cases where it becomes absolutely necessary to apply something to the soil of pastures for their renovation, and in order to produce the valuable swards that are necessary for a good pasture. That is a question of vital importance. The speaker says we need fertilizers for our fields, and to be sure we do; but where are we to get something that will renovate our old and worn-out pastures? We do not realize so much advantage from the droppings of our stock as we ought. Now many of our pastures are filled with a foul growth, which in many cases is absolutely increased by the droppings of our stock. Now



we must stop that, certainly, or we can never renovate the pastures. How shall we stop it? These rough pastures must be reclaimed first. A good pasture is much above the value we place upon it. I think the only way is to devote better lands to pasturage, and by this means save the droppings of our stock to produce a growth of suitable feed.

Mr. FLOYD. I have had a little experience in old pastures, and I have noticed that farmers learn a great deal more from experience than from theory. Thirty years ago I went on to an old farm. The pasture was run out, although the land was good; but it seemed more inclined to grow up to bushes than to good grass. I went to work and cut all the wood, and where I cut an acre of wood, I burned and brought it into grass, and finally into pasture again. I found it worked well. My cattle fed even on this small space of one acre. I have kept on cutting and fixing in the way I have spoken of, and now the larger part of my pasture is where my wood lot was twenty years ago, and my old pasture is coming up to a young growth. I find my cattle like the change to a new place very well. I did not plow it. I found it was hard to work, and never plowed any of it. I burned the brush and sowed red-top and white and red clover seed on it.

Dr. ALLEN. In regard to the improvement of worn out farms, it is possible for feed to be grown as long as there is any virtue in the soil. A little more than a week ago I was in the bleachery at Lewiston, and I there learned some facts in chemistry which were new to me. The foreman, I venture to say, is as good a chemist as there is in Maine. He told me some facts in regard to agriculture that I was glad to learn. Taking up a test tube, he put in a little ammonia and wanted to know if I smelled it. He said there was ammonia passing off all of the time. I asked him what was the best thing to prevent it from passing off into the air, and he said plaster. I asked him if muck would not do. He said it would, but he should prefer plaster. I think the principal office of the plaster is its absorbent properties, and it will not do well on clay because clay is a good absorbent itself.



Gen. BROWN. I have a word to say in regard to plaster, which I think may be acceptable to some. It has been said here that experience was the best teacher. I count it so; and we found in our town by actual experience, that where plaster was used on dry soil it did very well, but where used on wet soil it was utterly useless. We got double the amount of potatoes by applying it, about a spoonful in a hill.

Mr. BRACKETT of Waldo. In my county we raise a pretty large crop of potatoes. We have plaster mills, and farmers use much plaster; and there they apply it to the different kinds of soil, and the effect is good. They raise thousands of bushels of potatoes, with nothing but plaster. I have used it as top-dressing on fields without seeing any benefit at all. I have used it on uplands with good results. I have an idea that it acts as an absorbent for ammonia, to certain limits.

Mr. KILBRETH. I have had some experience in the use of plaster. My farm is granite soil, and after an experience of five years I have come to the conclusion it is best to apply when I plant the crop. I have usually bought a quantity of superphosphate, and use two parts of plaster to one of superphosphate. I put a small quantity in each hill for potatoes. I tried the experiment of planting two rows without this mixture, and there was a marked difference from the time the crop came up all through its growth. I gathered three bushels of potatoes from the rows planted with plaster and superphosphate to one where there was none. I have succeeded well in raising corn with it, but so far as top-dressing is concerned, I never could do much. On my clay loam I noticed a slight difference in grass where it was applied, but on upland none at all.

Mr. LELAND. I think that where you can pasture ten cows you can also put in ten sheep, and the cows will be as well fed as before. You can also add a horse occasionally. The grasses that one would reject the other would eat.

Dr. NORTH. Much of the advice given farmers in regard to improving their pastures, I think is not practical advice. This matter is one we should take hold of earnestly, and at

the same time with economy, and in a way we can make pay, if possible. As Mr. Floyd said, we should do something for our pastures. I think very favorably of his course, and it has been my plan to some extent. My pasture last year carried, notwithstanding the severe drought, twelve head of cattle and thirty-four sheep and lambs. I am satisfied the sheep have been a source of immense advantage in the improvement of that pasture. Of course I don't know as I am right, but I think that a pasture ought to be stocked so heavily that no grass will be allowed to go to seed, and if an old pasture the cattle will be obliged to feed on those rank grasses that occupy the soil in July and August. Of course, I would not advise over-stocking. It has been proposed to top-dress run-out pastures, but I do not think farmers can afford to top-dress their pastures.

Mr. FLINT. I think if a man will stock his pasture with twice as many sheep as it will carry, and make up the deficiency with grain, he will gain much in the condition of his pasture.

Mr. GILBERT. I am glad to hear the remarks of Dr. North. I am glad there is a man here bold enough to advocate such views. A few years since I came into possession of a pasture overrun with bushes. I had heard the advocacy of the method usually pursued of allowing the growth of grass to remain in the pasture and not feed too closely, and especially to allow a portion to remain for the protection of the land in the winter. So I took in additional stock and turned my own into this pasture. They had more feed than they could use, and as a consequence large quantities of that grass remained upon the pastures through the winter. After having practiced this method three or four years, I found I was ruining my pastures, they were becoming by that practice so foul. I have been subjected to the expense of clearing them from foul growth which the method pursued allowed to take possession of the land. I think that occasional close feeding is beneficial to pastures, and, I may say, absolutely necessary, on all kinds of soil.

## THE RENOVATION OF WASTE LANDS.

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BY I. E. MALLETT, TOPSHAM.

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I am aware of my inability to recommend or even hint at the best course to be pursued with reference to the improvement of quite a large area of the lands of Maine, as they stand to-day. What may be truly considered as "waste land" in one locality, may not in so great a sense be so considered in another, merely from location or requirement. In some localities near our larger towns or cities, it is very different from what it is farther away; in close proximity to them, it seems that there is a demand for every square inch of land being improved, even at a cost that would be considered exorbitant in sections more remote, so I think no special rule will apply in all sections alike, except it may be this—that whatever land is worthy of cultivation, is worthy of being cultivated well. Brains will decide for us under all circumstances, if we only consult them as intelligent men should do.

In treating upon the "waste lands of Maine," I shall only refer to a few of the more common kinds or classes, and offer my ideas of the most economical and practical manner of improving them. I am fully aware of the comprehensiveness of this subject. It is one that almost every farmer has to consider, and one with which perhaps every farmer has had more or less practical experience, for it is a hard matter to find a single farm but has had at some time, if it does not now have, more or less of waste land connected with it; and I am also aware that I have no new method for the improvement of such waste lands, but thinking, and knowing even, that we farmers are not more apt in our pursuits than other people, we think it no harm to give "line upon line and precept upon precept," here a little and there a little, hoping



that if it should not benefit any other, it may not to say the least, injure me in the consideration of waste land in my own premises.

I shall first refer to a class of land which in my opinion was not intended by our wise Creator for tilling purposes, although this may be made up with here and there a fertile spot, interspersed among very much larger areas, that man cannot subdue to profit, or bring into a good condition for common agricultural purposes without doing a vast deal of labor, which in my opinion is *lost* labor. For example: tracts of land, or rather of stone and soil, where ledges appear above the surface to that extent that it is a hard matter to find even one square rod in any one piece, for acres, that is naturally prepared for tillage, and these little spots being filled with stones from the size of peas up to prodigious boulders. It is no wonder that the boys leave the old man and old farm, and seek more pleasant and remunerative employment. It would be more encouragement if once clearing off the stones it would be done forever, but it is not so; every time such lots are plowed the stone has to be removed before we can do anything with a harrow, and then in harrowing we bring out another and entirely new crop of (as the boys sometimes say) younger stones, and they must be removed, too, before we can properly seed the land to grass, and then, even, we must go all over the ground the next spring and pick, and either pile up or haul away again. What a deal of hard labor has to be done in the cultivation of such lands, saying nothing of the wear and tear of implements. How much more the same amount of labor would realize upon the more naturally arable lands which are abundant and unoccupied in this State. We have quite a large percentage, in many towns, of a class of soil very different in nature from that to which I have referred, which I consider very unprofitable for general farming, viz: sandy plains land. I have often thought that I would like to have an acre or so of such soil for gardening purposes, as it is naturally warm and dry, thereby rendering it capable of being worked early

in spring, and consequently when nicely dressed each year, is capable of producing good crops, but a farm of dry, sandy land, away from a city market, is certainly a great load for a man to carry. I think a farm (or would-be farm) of this nature is a waste of land, and also of labor. My advice to any one occupying either of such lands as the two briefly alluded to, is to abandon them to grow up to wood and lumber. It is surprising to see how fast the growth will increase on such lands when left entirely alone; no stock allowed to encroach upon it. The former, stony, ledgy lands, are completely adapted to the growing of the harder varieties of our woods, and the latter or sandy soil, is the natural home of the white pine, that noble tree from which the State derived the name or title of "The Pine Tree State."

While speaking with reference to the encouraging of cultivating or letting the pine grow on sandy plains land, I will allude to another class of sandy knolls or hills, which are not confined exclusively to what we denominate plains land. I refer to those elevated spots from which the loose sand is continually being moved by the winds and very likely taken on to good fertile soil, thereby making that worthless. We always think when seeing one of these "sand hills," what a pity that the natural growth was ever cleared from such spots. They really have a dismal look to me, and if I were cursed by one of them I would try to restore it to its natural production as soon as possible; which is also the pine, but perhaps the pitch pine will flourish best on such spots.

I believe neither of the above classes of land should ever have been cleared for tilling or for pasture. The growth might have been cut off, but never have been cleared, but left to grow another crop for a future generation.

We are all aware that the forests of Maine are fast disappearing, and the few lots that remain are the most valuable acres we possess, or among the most valuable, and it looks to me to be an object for the agriculturist to look well to his forests, as well as his fields and pastures, letting, yes, even



striving to aid the growth of wood and lumber upon soils and localities that are comparatively worthless for cultivation ; and I would recommend to any one possessed of such tracts, even if they comprised his whole real estate, to abandon the idea of *farming* on them, and let and even strive to aid nature in restoring them to their natural and original production.

I now come to the consideration of another class of waste lands that too often meets the eye in enclosed fields—and that is, bunches of bushes growing luxuriantly on high and low lands. We all can tell how this came about. It was not always a large bush or bunch of bushes,—it came there by neglect. I have seen men when mowing with the old hand scythe, very careful not to cut or injure very small bushes, when they chanced to come to them, as we sometimes will on most any farm. The best thing to do is to pull the little bush up while it can be done easily, and not leave it as though it would become an ornament to the field. Now, although I believe in letting bushes grow, and even in cultivating them in their proper places, I would as soon think of breeding wolves to slaughter and destroy my sheep as of letting bushes get a start in a field, for they are sure to gain rapidly each year if left to grow ; besides, imagine the pleasure of driving the mowing machine around about countless bunches of bushes and stones, and of plowing and cultivating around them. The idea seems to me too preposterous to entertain for one moment. In all probability the soil on which these bushes grow is as fertile naturally as any about it, and I think it should be put to a different and better use, as it can be in many cases, with but slight expense, thereby adding beauty to our fields and money to our pockets. It is surprising how much we can accomplish in a little time when we go at it with a will. By the way, I am an ox man, and believe them to be the best animals to aid us in removing bushes, if we are so unfortunate as to have them. With a good pair, (and good ones are always the best,) we can soon be masters of the situation, taking them out (the bushes) root and branch. In some places drainage is necessary in



order to keep them from starting in the future; in many places, in fact, the want of drainage may be the prime cause of their growing. How many low, basined spots, have been cleared and properly drained, and thereby become very productive. There are still a great many more. They produce nothing and never will, till they are thoroughly reclaimed by draining and taking away the bushes, as I said in the other case, root and branch. I know that labor, earnest and persistent, coupled with "common sense," is necessary for the emergency; but who ever heard a man that had done a like job, say that he was sorry for having done it, but rather was glad, and ever ready to point it out as an achievement of which he was proud and with which he was satisfied, if for nothing more, the better looks of his field or pasture.

Many of us who live upon what ought and might be good farms are not worthy the name of farmer. We are too unconcerned, negligent, or indolent. The careful farmer does not allow such obstructions or sure marks of slothfulness to mar the beauty of his fields, but has an eye out continually for anything that may, in any way, detract from the beauty or productiveness of his farm.

There is another class of waste land that we see too often, and that is by the sides of fences. Indeed, some seem (by the looks of the golden rod, blackberry and raspberry bushes, and thistles, &c., on either side of the fence,) to think they are an ornament, and perhaps forming an incomplete hedge, thereby serving the two ends of ornament and fence; but I cannot see the point in either, for I consider bushes beside fences one great cause of breechy cattle, and certainly there is no beauty added thereby, and certainly they occupy good and naturally fertile soil in most cases. My advice is, take them out, root and branch, and then keep all others out in the future.

In conclusion, I would urge the necessity of improving still more extensively the lower lands which have been receiving for ages past the wash and sediments of the surrounding hills, thereby rendering them very fertile and consequently

remunerative, and let the exhausted lands upon the hills grow up to wood for the next generation. It would be well, I think, to devote a very considerable portion of our most exhausted lands to the growth of wood. Fuel and timber are becoming of steadily increasing importance, and the effect of a growth of trees on the redemption of land from sterility, is very considerable; their roots exert great power in decomposing the rocks in the soil, evolving from them the mineral of plants, and besides deepening and mellowing the soil. A forest growth would add to it, by an annual deposit of leaves, a great amount of vegetable matter. In fact, no small part of the productive power of newly cleared lands is attributable to this very process, having gone on year after year; and why may it not be the part of wisdom to profit by the hint thus furnished in the operations of nature? Besides this, a collateral advantage of no mean worth would result from the lessening of the number of acres under cultivation, which would enable the farmer to work the remainder more thoroughly and of course more profitably.

#### DISCUSSION.

Mr. FLINT. This is a question of much importance. I think we have communications enough in our papers on agriculture to convince our farmers that waste and wet lands can be drained, in many cases. By doing this, fields may be united, and a great improvement made. The cost of drainage is an item which varies much in respect to the manner in which we handle it. To hire labor would sometimes cost more than the land is worth after the work is completed. Where the ditches can be made with the plow and scraper, the oxen and horse do it; and if they can be filled in the same way it is a much easier and cheaper mode than to do the same amount of work by hand. Such work has been done to great advantage, and at a great saving of cost. These things all depend upon the skill and ingenuity of the worker, and we find it is the same in all professions. The man of the most brains is the man who is most likely to

succeed in his calling. Farming is no exception. A man has as broad a field for the exercise of his brain, and perhaps a broader one than in some other professions.

Mr. BURLEIGH. This question is not only what we shall do with our waste lands, but what we shall not do; and as a matter of fact, I think that what has not been done has been more beneficial than what has been done. Now I want to show you what a couple of farmers in my town have done. One was a hard-working man; worked every day, and as a natural consequence his oxen and help had to work hard also, and he was always poor. He took up a farm of three hundred acres. He was thought to be well off, but at the time he died his estate was insolvent, and he paid ten cents on a dollar. Notwithstanding all his work, his land had to be sold by auction. The other man had a piece of land which his father cleared and sowed to rye. It was one of these hill tops. Well, he, the son, preferred to let it alone, and seventy years after I paid him two hundred and sixty dollars for the pine on the piece. He worked with his brain, and died well off. There are to-day hundreds and I may say thousands of acres, which if let alone and cattle kept out, would in thirty or forty years pay four times as much as could be got from them in any other way. I think less land should be cultivated and more acres allowed to grow up to wood.

E. W. ANDERSON. I think there are too many of our best acres in timber land to-day, and too many poor acres cultivated. I regard the swamps as worthy the notice of farmers. It has been proved that some of the best grass crops of New England have been taken from swamps. I think one of the safest and best paying investments for farmers is to clear up and drain their swamps. Some of the best land on my place was once a swale.

ALDEN WATTS. I have always derived much profit from drainage. I have one piece of land under a hill and there were many springs upon it. In some winters ice would form upon it a foot deep, and consequently would kill the grass.



I lay cross drains under the ridge, to cut off these springs. I dug them two and a half or three feet deep, and stoned up with small stones, and the most of that land has been in good condition for crops ever since. It can be mown with a machine, although there are a few places where horses break through in plowing.

Mr. KILBRETH. I have learned from observation and experience that one of the nicest points of farming is to clear successfully, such pieces of land from water. I have had some experience. Thirty years ago I worked for a man who had a piece of land which bore nothing but hardhack. My employer asked me if I would take some men and reclaim that piece of land. The first thing we did was to under-drain. We took oxen and plow and used them so far as we were able, and then we built up with stones. The owner was a manufacturer of oilcloth, and after we had filled in the stones we would lay a coating of strips and scrape on the dirt, and make a gentle slope. We renovated the whole of the field in that way, and from that day to this from two to two and a half tons of hay to the acre have been cut on this under-drained land. Some of the drains were not more than six rods apart. I think drainage is excellent for grass and grain. However, I think Mr. Burleigh is right in saying that there is much of our waste land which should be allowed to grow up to wood.

## THE METHODS OF MANURING.

Following one of the "agricultural readings" of Mr. Joseph Harris of Rochester, N. Y., which proved so valuable a feature of the annual session of the Board, the following discussion ensued, which will be read with interest, as giving the practice of Mr. Harris in managing his farm dressing, as well as that of other good farmers who took part in the discussion :

Mr. GILBERT. I think it is an important question whether or not valuable results are secured from the growing of clover, and whether it is a valuable crop to the farmer. I wish that the speaker might emphasize that point more than he has. As for us, we have not made much account of clover as a renovating crop, although we read of its importance in other sections.

Mr. LELAND. I presume Mr. Gilbert does not wish to have us understand that he uses no clover. I don't know as any farmer seeds his land without putting on clover.

Mr. HARRIS. I have much faith in the practical common sense of the farmers of the community, and if they do not raise clover I think it is because it is not adapted to their lands. I raise much clover to sell. I would not recommend it as a renovating crop. If I had doubts about it I would experiment a little. I certainly would not raise it to plow in as a manure, in a section of country like this, where you can raise good butter and cheese, and can buy cotton seed cake for twenty-eight dollars a ton, cheaper, much cheaper than we can get it our way, I should raise clover and feed it to my stock.

Mr. LELAND. How do you use your farm dressing—manure in the hill, or spread it?

Mr. HARRIS. I keep quite a large stock, many pigs and many sheep, cows, horses, etc. I use my manure principally for growing roots—mangel wurtzel, &c. I keep my manure as far as possible fermenting. I have told this to many, but most of them seem to fail in making the plan work. I make a hot-bed of horse manure and keep adding to it. I have it made in a square shape and it keeps growing larger and larger. If it was of a conical shape the first cold weather would freeze it, but on account of its shape, and as there is quite a body of it, the cold weather does not affect it. I allow this pile of manure to remain until March, and then draw it over and it gets into good condition for spring. I sometimes adopt another plan, of drawing it into a lot where I am going to use it, and let it stay until I get ready. The plan works well. That is one thing I am successful in. I make mine work to a charm, but I have had letters from persons I have explained my plan to, and who have tried it, saying they cannot make it work. But I know it will if properly done. I sometimes spread it broadcast on the land, harrow it well, and plow it in; that is one plan, and another is to use it in a kind of drill. I do not know which is the best.

Mr. FLINT. I wish to ask Mr. Harris this question: If the value of the manure is worth \$6, and the value of a ton of shorts is \$15 or \$16, is the manure of the shorts worth two and a half times as much for application to the land?

ANS. I should think so, sir.

QUES. Where will you place the comparative value?

ANS. It is worth about \$7, I think. Of course I do not say the manure from a ton of corn meal is worth \$7. If the manure from a ton of straw is worth \$2.50, then the manure from clover is worth from \$7 to \$10, and there is no doubt about that.

Dr. STURTEVANT. If the manure from a ton of hay is worth \$10, then that from one ton of meal is worth \$8; cotton seed meal \$42; but it all depends upon relative values.

Mr. GILBERT. Let us as farmers not be misled, but always bear in mind that manures have a commercial as well



as an agricultural value, and these two values don't always agree.

The CHAIRMAN. There is one thing we find when we strike the subject of manure, we strike the key-note. We are all interested in this question more than anything else. I hope some of these gentlemen present will tell us how they use their manure.

Mr. BOARDMAN. I am aware that Dr. Sturtevant is to talk this afternoon on another subject, but he has volunteered a word or two on this matter and I have no doubt the audience would be pleased to hear from him.

Dr. STURTEVANT. I would rather confine myself to my subject, but I will state one point. There are, I believe, three essentials; the seed, the soil and the treatment. The agricultural writers speak of the agricultural value of manure. I don't believe we know it. Different men have different ways of doing their farm work. I can sow in one way and get one result, while you will sow in another way and get another result; both, perhaps, equally good.

Mr. LELAND. I wish to ask Mr. Harris if he considers the waste of nitrogen and ammonia in the way he prepares his manure?

Mr. HARRIS. I do not bother my head about that matter at all. The amount I lose is so small that I do not stop to consider it. I aim to save all I can. I want my farming to benefit my pocket as well as expand my brains. I think my plan of preparing my manure to be a good one, saving both money and time.

Mr. BICKFORD. It is known that the principal crop in this region is the hay crop, so farmers apply much to the surface of their land, and the question arises whether this is an advisable method or not. There are many in these parts who apply their manure to their mowing fields; many of the farmers about here do it; I have done it myself. The land where I applied it was rather low, moist land. I tried ashes to the upland, where the grass had, in a measure run out, and the next year it came up thick to clover; also the second

year, and the coming year, I suppose, will test whether ashes are a valuable material to spread on my land or not. I would like to hear the experience of others in regard to barn manure for mowing fields.

MR. HARRIS. I have one field that has been top-dressed now for about fourteen years. I have top-dressed it almost every year. When I have had a load of manure to spare, I would put it there. Well, sir, the effect on that land is wonderful. I do not care what means I take to make my grass grow, provided I can get a good crop of hay, and can have a plenty of good feed for my stock. I have no doubt that in many cases that is the better way to apply manure as a top-dressing. Then the effect on my trees is beneficial. I have been quite successful as an apple grower. I got \$5 per barrel for my apples this year, (what I had to sell). They were sent to Europe. I got \$1,000 from four acres of orchard, and I consider that a pretty good return. Besides those I sold I had some twenty-two barrels which I put into the cellar for my own use. Now this is really the result of top-dressing. I keep my pigs and sheep in that orchard, and its richness is increasing every year.

DR. NORTH. Do you pasture your mowing fields in the fall?

ANS. I do, I am ashamed to own.

QUES. Does the Deacon?

ANS. No. I am pressed all the time to keep my stock growing, and I have had them in my fields some in the fall.

DR. ALLEN. In the experiments at the College, it will be seen in the last report, page 143, that where top-dressing was applied and then letting the land stand five years, the experiment worked well. That is the best way on some kinds of land. After the five years it will be seen there were 593 pounds of hay. The third year there were 75 pounds where no manure was placed.

THE CHAIRMAN. I will speak of the practices around Portland. Of course you understand, on the grass farms near the city they practice selling the hay. They can keep up the fer-

tility of their farms by top-dressing. They sell their hay—the land in fact is natural grass land—and haul back manure from the city, and top-dress.

Mr. BRIGGS. In order to give the question another turn, I will say that it is well known in the State of Maine that our seasons are so short that it is almost impossible to mature crops. I will give you a little idea of my own experience. I plow my ground in the fall and apply my manure, and pulverize the ground well; by so doing I get on to my ground from ten to twelve days earlier in the spring than I otherwise could.

QUES. Do you apply your manure in the fall?

ANS. Yes, sir, before the fall rains.

QUES. Am I to understand by that, that all the manure you make afterwards, you keep until the next fall?

ANS. I sometimes use a small portion on root crops. I usually keep the manure in the barn cellar until the next fall. I would rather make a sure thing of the crop than an unsure.

Mr. HARRIS. Mr. John Johnston, whom I have quoted several times, commenced to farm near my place with only \$100 or \$200, and he is now worth \$1,000,000. I go there and see him occasionally, and he tells me to go ahead in the course I am pursuing on my farm. His plan of managing his manure is this: He keeps it in his barn cellar as you do, for his next crop. He makes much manure from sheep, of which he keeps as many as one thousand. In the fall he draws out his manure that he has to spare, and spreads it as top-dressing on his grass land. He says I am doing right, and advises me to go ahead.

Mr. BRIGGS. I think if any farmer will try my plan of using manure, he will adopt it as a regular practice.

The CHAIRMAN. I think perhaps Mr. Briggs may be right. I will state a little case of my own, in regard to manure. I had some manure, perhaps it was three-fourths straw. I told my man to haul it into the field and spread it on the grass, which he did. Well, sometime in the spring I went to look at it and it looked to me just like so much straw. I thought



I could never mow that field in the world where it had been spread, and I intended to have it raked up and taken from the ground, but neglected it from some reasons until the grass started, and then it could not be done. When I came to mow my grass, I should never have known from the mowing that any straw had been spread there. It had gone somewhere, and it did not bother me about the hay in the least.

MR. BRIGGS. I want to ask Mr. Harris the question, if in the application of manure he does not find he can get on his ground earlier by six or eight days when the manure is applied in the fall, than he can when applied in the spring?

ANS. I think that is a fact. I think it is a good thing as regards getting on the land in the spring, and also through the fall and winter your land is better off with the manure upon it, and in the spring is more pliable and better fitted for your seed. I may be wrong in my theory, but think I am correct.

DR. NORTH. Do you harrow it in?

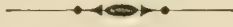
ANS. If I put it on in the fall I should put a harrow on.

MR. HARRIS. In coming here I was glad to see so much fall plowing, and I would like to know what you intend to plant on your lands you plow in the fall.

ANS. Everything, corn, potatoes, wheat, etc.

MR. TOLMAN. Some four or five years ago I had a piece of land bearing grass. I had some ashes and waste lime. I got ready to plow and plowed a little strip, hauled and spread the ashes on the ground. I continued in that way. I would plow a little piece when I had ashes to put on, and put them on, from haying time until fall. Well, the most marked difference was to be noticed where the ashes were spread—a decided change for the better being observed.

## AGRICULTURAL DEVELOPMENT A REMEDY FOR "HARD TIMES."



During the past two or three years there has been coming to us from every corner of the land, in an ever increasing volume, a strange watch-word of alarm and distress—strange indeed in a land of abundance, a country which sends annually 140,000,000 bushels of its surplus wheat to the hungry people of the Old World.

It has not been confined to Maine alone, but from the farthest West and remotest South the unwonted alarm is sounded up through otherwise quiet valleys, down village streets, reaching across from hill-top to hill-top, passing along our indented coast, and going from mouth to mouth all over the land. The wash-woman, standing beside her over-turned tubs, with arms a-kimbo, and several children playing upon the floor at her feet, thinking of the few hundred dollars she has laid away in a Savings Bank, which may, possibly, be the next to follow the prevailing fashion and "go up"—shakes her head as she hears the sound repeated by some friendly rival in the same business in which she is engaged, and goes about some other work with a sigh, and possibly, a sob. The day laborer looks at his rusty pick and spade or his useless hod; thinks of the "good old times" in the old country when he could live for sixpence a day if he could only get the sixpence; and of his hungry children at home whose greatest want is bread—and re-echoes the watch-word which comes from his co-laborer. The mechanic leans against his clean, smooth bench, where the fore plane rests in silence beside its brother, picks his teeth with the only shaving found upon his shop floor, and looks vacantly out of

the window to empty houses upon which are large placards, "Tenements to Let," which is the same watchword only that it is printed in different letters. The manufacturer and merchant, with warehouses heaped with cases of goods for which there are no orders, and ledgers full of charges to men who are solvent but who have not the ready means to pay their bills, tell to each other the doleful news and look into the future with something of hope that the bottom *may* have been reached, and yet with something of foreboding for fear it may be still lower down. The banker, with his gouty feet stretched upon a table level with his head, twirls his thumbs across his aldermanic stomach, and, thinking of the piles of useless greenbacks and heaps of more useless silver in his vault, drops into a doze to the music of "hard times, hard times," which comes up to him through all the grades of labor and of speculative effort from all the walks and avenues of life. And yet not all. From the home of the industrious, economical farmer there comes no sound of want, no cry of distress. The wolf which knaws at so many, many doors where is but a single loaf of bread to keep him away, turns from the farmer's home, as the rattling stones of hail turn from the transparent window during a fierce winter storm. The farmer may not be rich, but if he has been industrious he is certainly independent; and though he hears men speak of the "hard times" with deep concern, it is something that gives him little anxiety; although it must be admitted if he had put less of his hard-earned money into Western railroads and more into improvements upon his buildings, and underdrains and thorough culture upon his farm, the capital in his business could have been kept from shrinking, and his dividends have been more secure.

But though "hard times" seems to be a sort of universal watchword, in these days, it is not by any means a new one. There was never a time in all the past when grumblers did not live, and "hard times" has been the grumbler's watchword from the beginning of the ages. Now, however, the cry is not one of fault-finding, alone—it comes from men and



women who are forced to use it, and with whom it means all that it is capable of expressing when applied to the actual concerns of daily life.

Whence the hard times? Who has made them, and who is responsible for them? Who or what has caused the stoppage of the industries, the surplus of labor, the timidity of capital, the low wages? If men say it is the inflation of the currency, extravagant expenditures in State and nation, a surplus of all commodities—bread and gold alone excepted—a paralyzed market, the overdoing of every branch of business—in all of which reasons may be found many grains of truth—who will propose a remedy? While political economists are studying up their reckoning on this subject, and the above named representatives of a numerous class amusing themselves in the manner hinted at—we may try to find out some of the causes of the "hard times," look at a few of their results, and also search a little for their remedy.

The bare statement of the fact that agricultural communities are more independent and happy, and freer from the sufferings and privations to which the poorer class of dwellers in towns are subjected, is in itself sufficient to prove that the former is the better and higher mode of life. All comforts and enjoyments, possible or desirable, are within the reach of those who live upon the farm, who draw from its resources an abundance for all physical wants, who obtain from the surplus of its productions something for the culture of the soul, and the growth of heart and intellect; and who, content with moderate gains are patient, economical, hopeful, and trusting. But in the grand economy of States and nations, other industries than farming are needful to the completest results of a high civilization. Cities must be builded, mines must be explored, oceans navigated, and shops and manufactories kept in operation. *Men* are required for all these diversified pursuits, and let us say it to the honor and credit of the farm and of the men whom the farms have produced—that those who have grasped the highest prizes and won the greatest results in the work of the world, with hand and brain, have been

those who come from the wheat field, and the holding of the plow; men of determined purpose and stern integrity, disciplined in the school of hard labor, self-denial, and, it may be, of poverty. General prosperity has always followed the equal and harmonious development of all industries. Agriculture is the most remunerative, when flanked by a successful commerce and profitable manufactures. But, back in the past, men from the farm began to seek the city in order to engage in speculative effort, or to find a business better suited to their tastes. For a time agriculture did not suffer from this exodus of its men and women; and the cities were to a great extent benefitted and made better. It will be found, however, from a close inspection of the problem, that the disproportion between producers and consumers consequent upon the rapid increase in the population of our cities at the expense of the country, is one of the leading causes—though somewhat remote—for the present condition of society represented in the phrase of “hard times.” The forsaken country houses and deserted hill-side farms, which tell plainly of overcrowded tenement houses in the poorer quarters of our cities—for it is simply impossible to believe that all the men who leave the farm for the city become rich—tell also, without the aid of census estimates, that the number of persons who get their living by farming, has been, and is, growing less and less year by year. In the new States of the West, it is noticeable that there has been during the last decade a great and constantly increasing disproportion between producers and consumers. Between 1860 and 1870 the increase in the population of California was 48 per cent., while for the same period the increase in the city of San Francisco was 162 per cent. So, also, for the same years, Illinois as a State increased at the rate of 47 per cent., and the city of Chicago increased 105 per cent. The increase of city population as against country population in our own State, though not as marked as in the case of some of the newer States, is yet of the same nature.



In 1840, our total population was 501,793, and our city population 15,218—while in 1870 our total population was 626,915, and our city population 73,584—or 344 per cent. of city population to total population. A careful examination of the figures bearing upon this question as related to all our American cities, large and small, and in fact to the cities of the world, would reveal the operation of an agency at work to bring about these results, which is so fixed and regular in its operations as to be counted a social law—a law as active in France where the total population scarcely increases at all, as in Illinois where it increases by one-half during ten years; a law in operation alike in Maine with less than twenty inhabitants to the square mile, as well as in England with nearly four hundred to the square mile. And this law comes to us in some such form as the following: Under the conditions of society such as exist with us, and found also in several European nations, the inevitable tendency of population is to concentrate in cities. Where this takes place to an extent unaffected the products of the soil, it cannot be said to work a positive injury; where it does, of course the harmony between production and consumption is destroyed, and disaster inevitably follows. Following this, is the law that on every given area of territory, there is required a given number of laborers to produce food for a given number of inhabitants—the means of production being the same. Now, statistics show that in 1840 it took eight laborers to produce and deliver to the consumer a given amount of grain, while thirty years later, in 1870, in consequence of improved machinery and appliances for the shipment and handling of commodities, the same amount was produced and delivered by a single laborer. This fact, alone, shows that the proportion of city population to rural or country population might be seven times as great as it was thirty years ago, and result in no personal injury—provided the means of obtaining sustenance was in operation and open to all. But that such is not the case, the 150,000 persons out of employment in the city of Philadelphia alone,



during the prevalence of the labor strikes last summer, with a similar proportion unemployed in nearly all the large cities—bears abundant testimony. The non-producers or consumers, are so greatly in excess of the producers or creators of food, that bread riots are not uncommon, and the poorer inhabitants of cities are forced to a life of want, or to resort to questionable means of obtaining daily subsistence. It is positively sad to think of the large number of young men who might become independent and prosperous farmers, if they would remain contented with the slow but sure gains which agriculture confers upon industry and economy—but who, under a false idea of their own abilities and the allurements of sudden wealth to be obtained in other pursuits, rush to our cities to fail in an honorable business; or to swell the vast army of non-producers who live in idleness and want, and who rear families in misery and degradation. The statistics of crime and pauperism and ignorance, could they be obtained from all our cities, would reveal many a sorrowful personal history of those who had left happy farm homes to get rich in a short time—but who, becoming discouraged and ashamed to return to honest farm labor, have drifted downwards to vagrancy and ruin.

The report of the Warden of the Massachusetts State Prison for 1877, says that of 220 men sentenced during the previous year (1866), 147 were without any regular means of earning a living; while that of the warden of one of the Pennsylvania penitentiaries, for the same year, shows that out of 373 prisoners received during 1876, so great a number as 284 had no steady means of obtaining the means of support. And added to these—which are but one or two of a hundred similar facts—may be mentioned the sweeping but forcible assertion of General Dearborn, then collector of Boston, made in a speech in 1840 before the merchants of that place, which I give in his own words. He says: "After an extensive acquaintance with business men and having long been an attentive observer of the course of events in the mercantile community, I am satisfied that among one hun-

dred merchants and traders, not more than three in this city ever acquire independence. "It was," he continued, "with great distrust that I came to this conclusion; but after consulting with an experienced merchant he fully admitted its truth." In more recent years the same statement was made by the late Abbott Lawrence; and a canvass of the merchants on Long wharf, covering a period of forty years, revealed the fact that during that time only five in one hundred had not failed or died destitute of property. More than this: The directors of two banks in Boston, after a consultation to determine the fact, found that out of one thousand merchants who opened accounts during forty years, only six had not become bankrupt or died poor. Another instance just here, and I leave this point. Freedley, in his "Treatise on Business," states that accurate calculations, based upon periods of twenty-five and thirty years, show that not more than one per cent. of the best class of merchants in Philadelphia, and not more than two per cent. of the merchants of New York, ultimately retire in independence, after having submitted to the usual ordeal of failure. These facts might be largely multiplied—but they are sufficient to show the positive uncertainty of reaching independence in city pursuits; and the positive certainty of drifting downward into want, and misery, and crime, of those who live in cities without a sure means of obtaining daily bread. Why, only last winter, five thousand men, representing at least ten thousand persons, (including their families) who were out of employment, marched in procession to the Mayor of Boston and demanded labor or bread; while previous to the severe snow-storm of February last (and almost the only one for the winter of any severity) more than a thousand men were registered at the Board of Public Works in the same city, as desirous of shoveling snow at one dollar a day. And, mind you, these were respectable men—they did not belong to the questionable or vicious classes, but to the self-respected and worthy class. And yet, as necessity knows no law; as hungry men are beyond human control,—for the animal nature is stronger than the



human nature,—how very, very many of just this class must inevitably tend downward to misery and then to crime. But in farming communities there are no public soup houses, and few persons march to the municipal authorities to ask for bread or work. The statistics of good honest farming, the world over, never show records of bankruptcy, want, starvation, and very, very rarely of crime. Farmers pay their debts, and, with some grumbling, (and very likely little conception of the benefits they get from them) their taxes—which includes the education of their children, the support of the church, the public roads, and the advancement of good morals and high citizenship.

The question of the rapid increase of city as against rural population, and the consequent disproportion of consumers to producers, has been glanced at as a remote cause of that condition of society and business which we term "hard times." A more recent cause is found in the terrible civil war through which our country passed, the changed conditions which it imposed upon our people, and the ill effects it left upon almost every branch of business. All these things are yet vivid in the recollection of every person. Men remember how at the close of the war thought was quickened; the genius of invention breathed upon skilled labor and workmen were drawn together to give form to their cunning and to put their inventions into effective operation; large numbers of men were demanded to build elegant residences, business blocks, churches, factories, public works, long lines of railroads and telegraphs—as well as engines and machinery to keep these varied works in constant operation. But a limit was reached; building stopped; corner lots and palatial residences went under the hammer; machinery enabled a few to do the work of many; the services of the multitude of mechanics and common laborers were not needed; the wheels of industry were forced to a stand-still, and then came the unmistakable evidences of an over-production of nearly all kinds of manufactured goods. I am aware that some recent writers on the new phases of political economy, insist that the labor troubles



of the last summer were not occasioned by over-production, and argue that it was due to a mistaken notion on the part of trade unions and other workingmen's associations, that over-production was a danger against which they must protect themselves. But while over-production simply means a lack of market on account of a lack of work and wages of laboring men, it will take but a moment's consideration to show that improved appliances, increased facilities, and enlarged capital have led to an over-production of the commodities which enter into daily use and business, which has had much to do with the present stagnation. It is an axiom in political economy that production and consumption should, like the two wheels of a carriage, move together and at the same rate of speed. But see how the war stimulated production. A million of men in the field who were consumers instead of producers, excited inventive genius to its utmost, while the expenditures of the rebellion—ten thousand millions of dollars—tempted a reckless investment of capital, and led to the development of labor saving machinery and the increase of productive resources, throughout the nation at large, such as had never been known before. Think of it for a moment; take the improvements and multiplication of machinery for the manufacture of boots and shoes—a single pegging machine doing the work of a dozen men; the use of steam punches and dies in the manufacture of tin and copper ware; the use of steam crushing, drilling and pumping machines in mining operations, the use of steam planers for wood work—which are but a part of the increased uses of machinery in superseding hand labor. Two or three watch factories in our country supply a world with time keepers, and actually threaten the national industry of Switzerland; through the aid of new machinery, both of horse and steam power, more wheat was raised in the western States during the last years of the war, than had been done in the same time previously, notwithstanding the withdrawal of immense armies of able-bodied men from the farms; the diamond and sand-blast drill through mountains and cut granite from the quarries; donkey engines

displace crews of old-time stevedores; steam crushers break the stones; steam and horse power rollers place them, and machine brushes sweep them in our city highways, and elevators load and steam winches discharge a 3,000 ton ship in twenty hours. These, however, are generalizations—look at a few facts:—The increase of manufacturing establishments in this country between 1860 and 1870 was about 80 per cent., while the increase of farm lands and farmers, during the same period, was 25 per cent. of the former, and 23 per cent. of the latter. At the same time the increase of those persons who are employed in making artificial flowers for ladies' hats—the ladies will pardon me, I state only the facts—was 100 per cent., and billiard and bowling saloon keepers, livery stable hangers-on and travelling showmen 400 per cent. It really seems that we need seek no further for the cause of the mystery of hard times—but a fact or two bearing upon increased production in consequence of increased facilities, must not be passed over. Mr. Edward Atkinson—a high authority in subjects of industrial statistics—computes that ninety per cent. of our population by use of new facilities can produce all that one hundred per cent. consume of food, fuel, clothing, tools, wares and the like; and also all that we have markets for abroad. A recent estimate by a gentleman familiar with the business is, that the spindles of our country, all in motion for the usual working hours, would produce fifteen per cent. above the consumption of the country. Another high authority (*N. Y. Com. Bulletin*) estimates that in recent years the workmen engaged in the iron manufacture in this country have increased seven fold and the manufactured product ten fold; in the leather work and manufacture the workmen have increased  $5\frac{1}{2}$  fold, and the quantity seven fold; and in the clothing trade the workmen have increased twelve fold, and the goods produced six fold. The modern splitting machine in tannery displaces the labor equivalent of fifty men; while a recent method of cooling glass moulds turns out 2,000 pieces in the time for 600 pieces by the old mode. In the



transportation and shipment of commodities, also, see what vast differences are made by the use of improved appliances. Great staples are now moved directly in immense quantities from inland sources to shipboard, thence by steam to foreign markets in such heavy tonnage and with such rapid speed as to reduce essentially the percentage of manual assistance in the business. A foreign statistical writer shows how the Suez canal annihilated the use of 2,000,000 tons of sailing vessels and incurred immense loss in the utter extinction of previously existing appliance of the India trade. Within thirty years the coasting trade of our own State, which then gave employment to a fleet that filled the piers of Boston harbor, has been very largely superseded. Lumber, bricks, hay, coal, iron, grain, cotton, flour—no longer cumber her streets as formerly, but glide around or under them in trains, direct to their destination of consumption or export; doing away with a small army of sailors, stevedores, truckmen, clerks, porters and helpers. In brief, it may be stated that comparisons between the past and the present in almost any of the branches of business life, thought or activity, will most impressively illustrate the displacement of hand labor by machine appliances—not perhaps in actual numbers, but in proportion to the volume of business performed. There are few, I suspect, who would be willing to go back to the days of hand looms, and jack planes, and tallow candles, preferring the conveniences of modern life with all its handy notions turned out in a lathe and stamped with a patented “trade-mark,” nor is there a necessity for it:—but there *is* a necessity that more return to the life of the farm with all its wholesome and homely occupations and enjoyments, rather than to join the great procession of idlers, bread consumers and grumblers, who march along our streets, loaf at our small stores, and are all the while bewailing the “hard times” which have overtaken them.

It does not belong to my present purpose to treat of other potent and tangible causes which have been at work to bring about the present stagnation of the business of the country.



To do so would be to consider questions involving principles of public policy about which men have different opinions, and whose discussion might carry us away from the truth rather than bring us towards it. But I think most will agree that a currency representing a fictitious worth, which had the tendency to stimulate reckless expenditure and extravagant modes of living, together with the reduction of the amount of business done in most branches of trade by the recent decline in values and the reduction of manufactured goods—have been among the most prominent of these causes. To speak of these would be to weary you with an almost interminable discussion, and so I pass to another matter, leaving each to think out the bearings of these features for himself on his own line. And yet a single word just here. It is indeed encouraging that recent statistics concerning the great industries, give indications of a revival of prosperity. In lumber, in iron, in the textile industries, there are evidences of a decided improvement. The export trade of Boston and New York has opened better during the present year, than in any corresponding year during the past four years. During a single week in January, six large steamers left Boston for England, the total value of whose shipments were nearly \$1,500,000—being chiefly breadstuffs and provisions—while in a single day, during the same month, as many steamers left New York for the same destination, with cargoes of equal value; while in our own city of Portland, six vessels were, a week or two since, loading, at the same time, with breadstuffs for the Old World:—breadstuffs, brought, it is true, from the Great West by means of the Grand Trunk, but breadstuffs a part of which our own farmers could grow just as well as Western farmers, if they would but put energy, and manure, and elbow grease into their farming operations. We might, at least, through these agencies, produce enough for our own consumption, if we would.

And now consider with me in a very brief way, a remedy for all this unsettled and unsatisfactory condition of the times—a plan not original with myself, for it has received

the attention of deep-thinkers and eminent political economists in the present, as well as in the past; but one which in this discussion I shall apply to our own State and our own conditions, asking for it from you all a careful attention. It is that farming—as a business, as an investment, as a firm and staple occupation, shall be more largely engaged in than heretofore—engaged in with a purpose, with honest endeavor after success, with a true aim for its compensations and a love for its rewards; that the back lanes and poor tenements of our cities shall give up their miserable inhabitants, sending them forth into the green and health-giving country, where they may gain an honest living and bring up children who shall go to school, never knowing what it is to be hungry; that our forsaken and neglected farms shall again be made the happy homes which they once were, and our rich and abundant public lands be occupied by sturdy men who are not afraid to work, but who have the courage to meet the slow and honest gains which are sure to come from intelligent, economical and persistent labor upon the farm.

It is a truth of political economy that *land, real estate*, is the only true property. Blackstone, the foundation author in all legal matters, defines land as *real* property because “it comprehends all things of permanent, substantial, fixed, immovable nature.” In many parts of the Old World, where land is poor, and rugged, and often somewhat desolate, it is held to most firmly, alienated only under dire necessity, and forms a secure source of investment, in many instances even regardless of income. Capitalists often regard two per cent. return from real estate better than six from commerce and trade, because the land gives no losses; while in speculative pursuits the losses are so numerous as to shrink the income, frequently, below two per cent. Land being so stable and secure, the wealth coming from its culture, or the increase which labor bestowed upon it yields, is alike positive and safe. Old Adam Smith—the man with two famous names, who has been regarded as the father of political economy—gave utterance to these forcible and enduring truths:



“Wealth arising from the solid improvements of agriculture is most durable. No equal capital puts in motion a greater quantity of productive labor than that of the farmer. Not only his servants but his cattle become producers. Nature, too, labors along with man. Her work remains as a gain after deducting everything which can be regarded as the work of man. But the capital which comes from commerce is precarious in possession.” Thus while the value in land is real, and the wealth which comes from its improvement tangible and sure, the money which is yielded by trade, and rents, and warehouses, and factories is uncertain; and often, as is the case now with some kinds of rents and factories, a man is better off without them than with them. Yet, marvelous and strange as it may appear, our people, especially our young people, infatuated with the unreal pictures of ease which they imagine city life affords, and crazed with its false allurements—are actually giving away their land, and abandoning farms and houses which are the only real sources of wealth, independence and happiness. But we have known instances, and so have you, doubtless, where many of these persons who have left the farm for some seedy occupation in a village or city, have been assisted by some farmer relative, with a barrel of potatoes, or a firkin of butter, or a quarter of beef, to replenish their empty larder—or, where the city-starved family has found a secure shelter and plenty of food, over many a shut-down of the mill, or a suspension of factory work, at the old farm home of their fathers! .

It needs few statistics to prove that the agricultural population of a country is its true element of power, its real conservative force. It maintains its ground in quiet and persistency; and alike, in war and peace, carries on its life-giving pursuits and adds to the wealth of the nation. It, alone, is free from the evils which come to society from an excess of non-productive population, extravagant expenditures, an unstable currency, the over-supply of manufactured goods, and even war itself. In France, during the reign of radical Communism, its six millions of landed proprietors



became conservators of the law, guaranteed tranquility, maintained the public safety, and paid the German indemnity of two billions of dollars in gold, in less than two years and a half from the date of the peace negotiations. Thus the farmers of France settled the grandest financial problem ever presented to the consideration of its people; and it is safe to say that no other nation on the face of the globe could have performed so marvelous an undertaking in so short a time. And why? Because in the thrift, stability, energy and flexibility of its agricultural population, France beats the world. And what is true of France is true of our own country,—notwithstanding but ten per cent. of our territory is devoted to purposes of agriculture, while in France more than half its land is under cultivation—and true, also, of every state and nation, the masses of whose population own the soil and engage in its profitable culture. Those that own the soil own the country, and land ownership is the basis of the only true material wealth. Buildings burn, banks burst, ships sink, wealth takes to itself wings—but the land remains. Who has ever heard during the past four years of panics, and suspensions, and defalcations, and irregularities—that the earth has opened and swallowed up a man's farm? Or that something has come down and covered it all up so that he could not find it? We make no reference to mortgages and attachments—the farmer must look out for these. But the fact remains—that whosoever owns the land and tills it in such a manner that it does not grow poorer, must be himself growing richer. The farming industry is the basis of all wealth, the governing power of all commercial industries, the foundation of all security. “The king himself is served by the field.”

“Yes,” you say, “we admit all this, and believe the raising of bread and the production of meat, with the attendant industries and manipulations they require, would form a complete means of relief from the burdens of the ‘hard times’—but how are poor men, now living in want and distress in cities it may be, friendless and discouraged, to be placed in

positions where they will cease to become a burden to society and gain for themselves bread and independence?" I answer, that there are a large class in cities who only need to have these facts clearly presented to them, to take up with the opportunities for obtaining a good living and ultimately something for themselves which farming as an industry presents; and the severe times through which these men are passing, will, more than anything else, have a tendency to bring this about. Then there is another class who cannot so well help themselves, and who must be aided by capitalists, to settle upon State and government lands. I know capital is capricious, timid, and shy of investment—but at the same time, when capitalists are sure of a fair "per cent." without risk, money will be found to aid in this enterprise. Already societies and agencies are being organized to occupy the government domain with the unemployed in cities, and it must in time bring good results, for whatever tends towards the decentralization of population and labor, will surely operate as a relief to the present evils. The merchant or manufacturer sends his goods to a market not already overstocked with goods of the same kind; and working men must go, not to cities already crowded with unemployed laborers, but to agricultural fields which await their labor, where it may be used in producing that food which the millions of the Old World demand, and the production and shipment of which sets in motion other industries that contribute to the world's business, and the world's wealth. It is, I am fully aware, a most difficult and perplexing problem—one which seems the more difficult of settlement the more it is discussed—but I am so firmly persuaded that the cultivation of the land, the growing of human food, and the life of the farm, for all classes of unemployed men, offers the only true and consistent solution of the problem, that it must be written, and preached, and spoken—until our population is more in harmony with the laws of production and consumption, our public lands occupied, our capacity for food crops greatly increased, and the



unemployed portion of our population set at work to a sufficient extent, at least, to produce the food they consume and the clothes they wear.

There seems to be an inclination on the part of some agricultural writers and those interested, possibly, in the sale or settlement of western lands, to promote organized migration from the east to the west, and to induce young men to *leave* New England and especially Maine, for what they are pleased to call the *better* conditions for profitable farming found in the newer sections of the great West. There is no necessity for such a scheme, and we of New England, of Maine, need to counteract this idea to the greatest degree possible; knowing, as we do, that Maine and New England offer opportunities for profitable farming, together with all the facilities and advantages of good markets, a high civilization and a breadth of culture which new countries do not provide—and such as few of the proposed western communities can offer. The superior lands of Aroostook, of the Dead River valley, of northern Somerset, Piscataquis and Franklin, capable of growing thirty bushels of wheat, seventy bushels of shelled corn, and two tons of hay per acre, are a heritage of riches, available to all young men of industry and character, who will, by a course of honorable economy and energy, occupy and improve them. Not by any spasmodic action, but by a steady, determined effort that means business. How much better off, think you, in ten, yes, in five years, would have been those hundreds of young men from our own State who scraped together a few hundred dollars and left last fall for the "Black Hills"—had they gone to Aroostook, taken up a farm, expended the money in improvements, and endured only half the privations which they did in Dakota and Montana? And should we not, in the future, by every possible means, do all we can to prevent this exodus of our young men from the State?

I can think of few sights more displeasing to an industrious person, than to see a young man with heavy frame and strong arms, who would be a hero in the hay field, spending his



time and his muscle as the proprietor of an air-gun shooting gallery, or selling shaving soap from house to house, in the streets of our cities. I accidentally met one of these last named gentlemen not long ago in my own town. His boots were large and heavy; his face young and fresh, and his arms stout. He carried in one hand a small wooden trunk, from which the lock had been broken, the lid being fastened by a leather strap. He met me with an air born of some brass and some conceit, and showed me his wares with an awkward gesture, but one which would have been full of grace had he held the nibs of a scythe-snath in his hands. In one corner of his box he had a dozen cakes of shaving soap, which he sold at ten cents each, or three for a quarter—"soap of *our own* manufacture," he assured me, and which would make a lather "that would not evaporate in twenty minutes!" I confess I looked upon this young man with feelings of mingled pity and contempt: with pity, thinking perhaps he had had a hard master upon some farm, who had made him work early and late with dull and heavy tools, given him few holidays, no money to spend for himself, and no books to read—with contempt, that a strong young man, six feet high, of handsome face and strong arms should be content with selling shaving soap from house to house. I should have honored this man had he been feeding sheep in a barnyard, or standing beside a bin of golden corn his own hands had grown—but as it was:—I thanked him for showing the "goods of our own manufacture" and shook my head. Let me do him and others like him, no injustice. It is true, this young man may *possibly* make a Vanderbilt or a Stewart, but *probably* he will become one of the thousands, who, unless they leave our cities for the honest, safe business of farming, will surely drift downward to poverty and uselessness.

On the other hand I can think of few pictures more full of satisfaction than that of a well tilled and productive farm, the sunny home of a young and industrious farmer, who loves his business; is proud of his clean fields and handsome cattle; kind in his family, and loved by his children and friends—

who cares somewhat for the culture of mind, as well as the beautifying of heart and soul; who walks daily before the bounteous Giver of sun and shower, seed time and harvest, with a loving, believing trust, and who has few wants which his farm and his business fail to supply. The real independence of such a condition is a solid testimony to the safety and stability of the farmer's occupation, and the results of such a life are a better reply than the most compact argument, to the complaints, and sorrows, and discouragements of "hard times."





# PAPERS AND DISCUSSIONS

AT THE SEMI-ANNUAL MEETING AT

PRESQUE ISLE, SEPT. 25th-26th, 1878.

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## BEST METHODS OF RETAINING THE FERTILITY OF THE VIRGIN SOIL.

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BY CH. F. ALLEN, D. D., PRESIDENT OF STATE COLLEGE.

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The fertility of the soil has always been a subject of intense interest to man, from the time when sent forth to procure his sustenance, it was announced to him, "cursed is the earth for thy sake." The severe toil required to eradicate thorns and thistles, to plant, till and carry home useful crops, is not all that is demanded of the husbandman. Successive harvests gathered from the same field are found soon to exhaust the soil. The earth that for man's sin was once cursed by Divine Providence, has again and again been cursed by man's improvidence. Unless the materials taken from the soil are in some way restored, the supply of plant food will soon be exhausted, and barrenness and desolation will spread over the once fertile plains.

A difference was soon perceived in the rate of deterioration of different localities. Vallies constantly supplied with new soil washed from the hills, are more slowly exhausted. Intervales inundated by turbid rivers whose sediment is deposited where the current is more sluggish, are kept in perpetual fertility. These low banks annually receiving fresh deposits,

can honor all the drafts made by successive crops. But in the early husbandry the lands not thus favorably situated were soon exhausted.

To the traveller in the east, those old seats of empire once crowded with a dense agricultural population, now present only scenes of desolation. The vegetation of fields that once poured forth abundance, and when he that sowed reaped a hundred fold, is now reduced to the scanty herbage of the desert. Amidst the desolations of war and feudal oppression slowly the forests of Europe were subdued, and the howling wilderness gave place to fruitful fields too often fertilized with human blood. The rude cultivation of early times secured liberal harvests, for the accumulated plant food was readily obtained. When the dowry that the virgin earth brought to the husbandman was squandered, with diminished returns the poverty stricken fields reluctantly furnished a meagre supply, which was too often snatched by the warlike retainers of plundering barons from the famished laborers.

Nor need we go to the old world to find illustrations of the gradual deterioration of lands improperly cultivated. Thirty-seven years ago commissioners were appointed in Massachusetts to consider the subject of agricultural education. In their report to the Legislature these commissioners say: "Already the exhaustive process of perpetual cropping has travelled over the once fertile lands of New England, and in its desolating march is now wending its way over the fair fields of New York, Ohio, and the far West. Under the influence of this system of cultivation the crops of wheat in these States have receded from an average of twenty-two bushels to fourteen bushels an acre, or even less. And the same remarks will apply to other crops in like ratio of production. Do our farmers realize that the present system of impoverishing our lands will sooner or later end in barrenness? And if the present population may rightfully exhaust one-third part of the arable lands of the United States of their natural fertility, the population that will be here before the close of the present century will long before that period

have consumed the remaining two-thirds of all American territory! By a calculation that appears in a late report of the Patent Office at Washington, it is estimated that one thousand million of dollars would not more than restore to their original richness and strength the hundred million of acres of lands in the United States which have been partially exhausted of their fertility. This was the estimate in 1841.

The older settled portions of our own State can furnish examples of the exhaustive system of farming; and notwithstanding all the warnings of the wise, and the lessons of history, the occupants of new farms are inclined to pursue the same ruinous policy.

Scientific farming has, in the crowded populations of the old world, arrested the process of deterioration, and has restored the fields to more than their primal fertility. But prevention is far better than cure. It is much easier to keep up the good condition of a farm than to reclaim worn-out fields.

The important question now returns, How shall the fertility of virgin soils be retained?

The first expedient to prevent the loss of fertility, employed by early cultivators, was to let the land have rest before its strength was too far exhausted. The slow, but constant processes of nature in her marvellous laboratory, supply from the subsoil and the rocky strata around materials that have been removed in the crops. Gradually the coarser rocks are disintegrated, and the finer particles turned to dust yield up their soluble elements. Cold and heat, moisture and dryness, loosen the power of cohesion. The perpetual action of acids and alkalis on the earths, and the new chemical combinations ever forming, release plant food from masses formerly inert. The self-repellent property of the molecules of any substance and their attraction for other matter diffuse them through gasses and liquids, and supply the substance that had been removed from any locality. Slowly thus the soil regains its lost elements, and can support constant vegetation. The supply is varied in different localities, according to the nature of the subsoil and the outcrop-



ing strata, with other circumstances that hinder or promote the action. This capacity for continued supply, measures the natural fertility of the soil, and if this equals the crops removed, the soil retains its power of continued production.

In the economy of the Jews, provision was made for letting the land lie fallow. That the soil might not be exhausted, it was ordered that every seventh year should be a Sabbath of rest to the land; there was then to be no sowing or reaping, no pruning of vines or gathering of fruits, while what the land produced of itself was to be left to the poor and to the beasts of the field.

The system of fallow tillage handed down from remote antiquity is invariably pursued in the agriculture of Turkey. It is not as some travellers suppose, on account of the oppression of the government, or of the poverty of the land-owners, that extensive fields, even in the vicinity of the cities, are left to grow up to weeds and thorns. The wealth of the proprietor is measured by the number of acres he can afford to leave untilled. The custom of the more extensive agriculturists is to leave the land fallow six years out of nine. The owner cultivates one-third of his farm for three years, then leaves that portion to lie fallow and takes another third for tillage for three years, and so on in succession. Other proprietors of less extensive possessions cultivate and leave fallow one-half of their fields in the alternate periods of three years.

Another method of keeping up the fertility of the soil is a judicious rotation of crops. Vegetables differ greatly in their chemical composition and in the method of procuring their food. Successive crops of any one kind continued for a few years, will exhaust the soil of the element most essential to the growth of that particular plant, while other plants might thrive in the same soil. We might call certain plants potash plants, since they require a large proportion of this element, such as potatoes and beets. Others would be called lime plants, as wheat, and other nitrogenous plants, from the amount of this food required for their growth. Nature has

made provision for a rotation of crops in the natural productions of every fertile country, in the multitude of seeds, the methods of their preservation and transportation, so that it only requires a suitable soil to nourish them. Herbs once abundant, give place to others of a different race; forests of hard wood are succeeded by evergreens. The nurseryman whose highly cultivated ground has sustained for several years young apple trees, without any more dressing applied to the plat, sets out a new nursery of pines, spruces and cedars, and has a flourishing growth of evergreens produced for the market. The farmer alternates his grass and cultivated crops in order to retard the exhaustion of the soil. When the first European settlers came to this State, the plains of Brunswick were covered with spreading beech trees. This growth exhausted the potash of the soil and was succeeded by a dense forest of hard pine, whose long tap roots could penetrate deeper into the porous sand, and pump up the elements required for plant food; and as such a large proportion of the potash in the growth of the pine goes to the foliage, the accumulation of soil from the fallen needles would in the course of years have rendered the soil sufficiently fertile to supply all that is requisite for another hard wood growth, had not man with his destructive axe and consuming fire interfered in the process, and exhausted this accumulation in cropping the land with wheat barley and oats, till now only the scanty spear grass or humblest herbs can be sustained.

Mechanical cultivation enriches the soil by supplying the necessary physical conditions of plant growth, and promoting the solution of those substances that feed the crops. It also promotes the activity of those agents which bring into available form the supply that will be made by future demands on the resources of the earth. Breaking up the compact mass allows the air to permeate through the whole, and thus furnishes the oxygen which attacks the inert materials. Minute division of the soil brings into contact the substances whose chemical affinities or repulsions set in action the great laboratory of nature. The soil is thus rendered capable of

imbibing and fixing all the ammonia, potash and phosphoric acid that are brought into it in any way. The particles of earth thus minutely divided, retain in a proper state the water which performs so important offices in the vegetable economy. By plowing in the stubble and roots of harvested crops, the fertility of the fields is greatly promoted. In an old pasture or meadow field, when plowed up, the turf composed of what is left after cropping, living roots and so forth in the soil, is equal to four times the weight of that year's hay crop. If a ton and a half of hay had been taken off, then there are six tons of dry or vegetable matter which remain in the soil. In the case of clover, at the end of the second year the quantity of dry vegetable matter left in the form of roots is equal to one-half of the whole hay which the clover has yielded in the two years.

Among the mechanical methods of improving the soil in the old countries where more capital can be employed, in agricultural work, drainage stands pre-eminent. This in England marks the advance of agriculture, and is practiced extensively on uplands as well on lower tracts. By a judicious system of underdrainage, many soils naturally cold, heavy and unproductive, have been made warm, porous and fertile. The harmful stagnant water with which the soil was clogged has been removed. The air is enabled to circulate freely, supplying oxygen, carbonic gas and perhaps nitrogen, to be chemically combined in the interspaces of the soil with substances that by this contact are changed to soluble plant food. The evaporation of water from the surface is prevented, and the soil receives the genial warmth. Water cannot be heated from the top, and earth whose pores are filled with moisture must remain cold. By drainage the season is prolonged, and certain crops are made possible, that could not otherwise be raised in this latitude.

To keep up the fertility of the soil there must be a liberal supply of manure judiciously applied. With all the advantages of mechanical culture and of the rotation of crops, and whatever might be gained in the ruder method of letting the



fields lie fallow, without a plentiful application of good manure successful farming is impossible. The production, saving and judicious application of manures, are therefore topics of greatest interest to the farmers who wish to keep up the fertility of virgin soils.

That the farmer in Aroostook county must depend mainly upon home production for the dressing of his land, is evident to every one. Barnyard manure is a complete fertilizer, that contains all the products necessary for plant food. It is adapted to all kinds of soils when rightly applied, and to all kinds of crops. There is but little danger in its use even by the most unskillful. To the great majority of farms, however rich in plant food the soil at present may be, there is an absolute dependence on this resource against the loss of continual cropping. The adage is true, though it may not be apparent, "No manure no crops, and no stock no manure." Thus we come to the bottom fact, that grass is the old foundation of farming. In more than one sense we may understand the declaration, "All flesh is grass." As in the primal adornment of the earth the command first came, "Let the earth bring forth grass," afterwards "the herb yielding seed, whose seed is in itself and the fruit tree yielding fruit after his kind;" so in the perpetuation of earth's fertility the grass crop is of prime importance. This product, which is the life of the land, must be consumed on the farm, or its equivalent returned.

Among the profits of stock raising must be reckoned not only the milk, butter, cheese and beef used in the household and sold for cash, but also the amount of manure produced. In the scientific and profitable farming of England, the value of food for stock is determined largely by the quality of the manure it will produce, as well as by the amount of flesh and fat it lays upon the animal. In our State, where grass is king, the quantity, quality, harvesting and use of this crop, to a great extent, determines the question of the success or failure of the farmer. When we remember that in any business it is not so much what a man earns as how he invests that determines his wealth, we may better understand

that skillful farming is rather shown in the condition of the soil than in the magnitude of the crops removed. The power of future production ought never to be sacrificed for temporary gain.

The hog-pen is another source of fertility for the farm. However cheap pork may be in the market, the hog will pay for his keeping if you will supply him with sufficient material to work into rich dressing. The hen-house affords a supply of domestic guano equal to any that has been manipulated by dealers in commercial fertilizers. A single bushel of the droppings of fowls, properly composted with loam or muck, will furnish what is equivalent to a cart load of ordinary dressing. Thousands of bushels of wood ashes are annually sold out of the county of Aroostook to go to enrich the fields of the older settled parts of our State, and some are shipped to Connecticut and New Jersey. The owners of those old farms can afford to buy them and pay for the transportation. Can the farmers of this county afford to sell them? Each bushel of hard wood ashes contains four pounds of potash, worth seven cents a pound, and this is not half of the valuable properties, for two bushels of leached ashes are worth more than one bushel of the unleached. Ashes contain the most valuable material of the commercial fertilizers, and if these elements are purchased in any other form, they will cost more than the farmer receives when he sells them.

The bones of animals are rich in phosphates and nitrogen, but they are too often left about the premises to lie bleaching in the sun and rain. "Can these dry bones live?" Yes, in new created forms of beauty and utility. By grinding them to powder, or treating them with sulphuric acid, they may speedily be decomposed; or they will more slowly be digested if kept in a barrel with moistened ashes. Buried in the ground, it will be many years before they can be disintegrated and made to yield up their rich plant food. Almost every farmer is careless in this which is most essential to success, and allows much matter that properly belongs to the compost heap, to go to waste every year. Substances are

not utilized which contain the very best fertilizing properties, and which would add permanent strength to the soil. For lack of suitable absorbents much of the liquid manure is wasted, and the heaps of solid excrement mingled with straw are left to a slow combustion, most of the valuable properties escaping into the air. When all the resources of home production are employed, and the manure is carefully preserved from washing rains that leach out its valuable properties, and from the waste by evaporation, if then there is need of still further supply of plant food, the farmer must have recourse to commercial fertilizers. Even then I am inclined to think it will be a better investment to purchase the materials in the cheapest and most available forms, and compost them for himself, rather than to buy tons of material that are not worth the cost of cartage, which are sometimes found in commercial fertilizers, as an absorbent to retain their valuable properties.

Of the best methods of applying manures in order to secure the greatest crops and still retain the fertility of the land, I have but little to say. To a great extent this is a subject that must be left to individual judgment. A proper decision must depend on the nature of different soils, on the crops that are to be produced, and on the circumstances that are so different in the different localities. We may venture one suggestion, that it will generally be found the nearer the surface the dressing is placed, the more efficient will be its action; and that the more thoroughly it is incorporated with the soil, the quicker the returns. There need be but little fear in top-dressing that the ammonia will escape. There is such an affinity between the volatile alkali and the soil when it is spread on the surface, that but little loss is experienced. When piled in heaps there is the danger of loss of ammonia. Top-dressing is nature's method of keeping up the fertility of soils. Practical sagacity is necessary in the application of the principles unfolded by science, that success may crown the laborer. Agricultural science has unfolded great laws of nature in the development and growth of plants, and in the preparation of soils. There are still principles but half



understood even by the most scientific. The practice of successful farmers has been greatly improved, and yet there is still room for further improvement in the methods of procedure, especially in the preservation of the fertility of the soil. Shall these beautiful fields now so ready to respond to the demands of the husbandmen, be exhausted by injudicious treatment? Shall your sons in time to come abandon these farms you have left them, because they have been worn out and abused? Are you willing to repeat the practice of exhaustive cropping that has wasted the older settled counties of the State, and from which the farmers are slowly recovering by means of costly artificial manures and careful tillage? Lands here that at the present time have such an abundance of plant food that the vegetable increases its growth through the whole season, and scarcely begins its process of reproduction, and your first yield of oats or wheat all runs to straw, by successive cropping will speedily be exhausted, as they yield their life so freely at the demand made upon them. It is the part of prudence to look beyond the present; so to cultivate that he who hereafter shall till the land may be satisfied, and not have to complain that these fertile fields have become a land which eateth up the inhabitants. A soil once impoverished is with the greatest difficulty restored. The best method to retain the fertility of the soil is to present the subject in all its importance to the attention of intelligent and thoughtful farmers, and they will devise means to keep their farms from running out.

The minds of the farmers need cultivation, as well as their broad acres. The lessons of history, the facts gathered by extensive observation, the principles discovered by patient research, are rich treasures of wisdom. Education furnishes the key that unlocks these storehouses of thought to the studious and intelligent agriculturist. Intelligence, industry and economy must succeed in such a rich virgin soil, if the earth is not cheated of her dues. Hire your fields to produce and pay them well. Let not your "land cry against you, and the furrows thereof complain," for then will "thistles grow instead of wheat, and cockle instead of barley."

## DISCUSSION.

Mr. KILBRETH of Kennebec County. It is an interesting fact that while the farmers in the older portions of New England are expending vast sums of money for the purpose of restoring to their former fertility the lands that have become exhausted, the farmers of this county are considering the question how to preserve the virgin fertility of its soil.

In discussing the question we may assume, I think, that the soil will ordinarily retain its fertility when left untouched by the hand of man. The Creator has made provision for this, by the decay of vegetation, by the chemical processes that are taking place beneath the surface, and by the elements imparted to the soil, from the air, water and other sources. It may also be assumed that when brought under cultivation, the land need not lose any of its fertility. It certainly will not, unless cultivation degenerates into devastation. But the question is how? by what means and methods, &c.? In the remarks I shall make I have two suggestions of a general nature to make:

First, the land should be protected from all destroying and exhausting agencies so far as possible. These are many. Sometimes fire sweeping through the forests, burning the life out of the soil, does irreparable injury; in some tracts where, working the hillsides, when improperly protected, heavy rains carry the best of soil into bogs and ponds; and weeds of all descriptions are allowed to grow in such abundance that they make heavier draughts upon the soil than the crop that is cultivated. Now I only make the suggestion, that if you would preserve the soil in its present state of fertility, you must guard against all the agencies that exhaust and impoverish it.

Second, to preserve the fertility of the soil, it is necessary to put as much on to it, as you take from it. Now if we admit that the resources of the soil are practicably inexhaustible, that many of the elements that enter into the crops grown, are derived from the atmosphere and water, and that

the land once exhausted will, if allowed to rest for a few years, regain its fertility, still it is found true in practice that you must observe strictly the rules of addition and subtraction, and for every harvest that is taken from the land, an equivalent must be added; that is, whatever elements the growing crop extracts from the soil must be returned to it. I know of no other method by which its productive power can be retained.

And here the question arises, how can the requisite amount of dressing be obtained to keep the soil from deteriorating? I answer, that for the most part, each locality, each farm, should produce its own dressing. It may be economy in some instances to use commercial manures in limited quantities; but admitting that these have a certain value, they cannot be extensively used; they are too expensive. The *Maine Farmer* says: "The enormous amount paid out by Maine farmers alone, for the different kinds of commercial fertilizers, would thoroughly astonish us, if the accurate figures could be obtained. Low estimates called it \$325,000. It would be far safer to call it \$500,000; and this we are inclined to think would be much below the actual amount. There is great *risk* in using these fertilizers. Some are good, perhaps; but it has been found in other States that there is great fraud and deception in their manufacture, and the actual worth is not found in the article. Better, ten times over, depend upon the farm-yard, the compost heap, the home resources of every available kind. Let nothing of this nature go to waste. Let everything be saved, and what is now paid out for commercial fertilizers may be spent for other objects."

But it will be asked, is it possible for the average farms to produce fertilizing elements in sufficient quantities to enable the farmer to return to the soil as much as he takes from it, or enough to prevent it from deteriorating? I answer in the affirmative. It has been demonstrated by experiment that by a proper arrangement of barns, stables, pig-pens, &c.—by the use of muck, ashes, &c.—the amount of dressing may be increased one hundred per cent. But this requires care and



labor to do it. As much attention must be given to the production of manures as to the production of crops. In this way exhausted farms have been made productive, and it certainly follows, fertile lands can be kept fertile by the same means. And then, after the dressing has been obtained, care and judgment must be used in adapting it to the needs of the soil. Such elements must be used as are lacking. It is useless, for instance, to use lime when the soil contains an abundance of it. It is only by experiment and attention that the farmer can learn to use his fertilizers to the best advantage. I will only add, that it is necessary for farmers to adapt all these methods and agencies which intelligence, study and experience suggest, in order to realize profit from their labors without exhausting their farms. An old painter who had produced a master-piece, was asked by a young man learning the art, what he mixed his paints with, and he answered, "with brains, sir." If you would cultivate the fair fields around you, so that they will yield ample harvests, and at the same time retain their fertility, you must do it with *brains* as well as muscle.

Mr. HARRIS. The question under discussion is an important one to farmers. All the waste of the farm should be returned to the soil. You have here very rich, strong soil, but the idea that the richest soil cannot be exhausted, is of course preposterous. The average farmer is not aware of the vast waste accruing from the failure to return to his soil fertilizers equal to what he takes off in crops. As the doctor expressed it, it is easier to retain the fertility of the soil than to restore it after it is once exhausted.

Dr. PARKER. I do not think you can get up much enthusiasm among the farmers on this question, for the reason that our soil produces so abundantly that some think it will always last; but no man can travel through this country without seeing the effects of continuous cropping. If we examine the farms of the western counties we see the effect of long cropping, and this fact ought to warn us that in time our farms will reach the same state if we do not keep up the

fertility by constantly putting back on to the soil fertilizing elements. I do not think the farmers of this county have a right to thus impoverish their farms as they have in western counties.

Dr. LINCOLN. I have the misfortune to live on an old farm which has been cultivated, I think, sixty or seventy years. I am trying to bring it up to a higher state of cultivation. My rule is to put on more than twice what I take off. I live in a region where I can get seaweed, and I put on about forty or fifty loads of that and muscle-muck, and fish pomace I feed to the cattle and sheep. I save all the liquid manure. I was in your starch factory, to-day, and saw the immense amount of fertilizing element that goes to waste. I think you will find some day that the cultivation of potatoes will certainly exhaust your soil. If you put back on your land as much as you take off it will continue in a state of fertility, but if you do not, it will surely become exhausted.

Mr. FARRINGTON. I do not see how you can return, strictly speaking, all you take from your land. You have growing flocks which you sell; how are you going to return all they have taken off? You cannot do it. You may rely somewhat on the natural fertility of your soil, but you must not drain your farms too heavily.

Mr. KEYES. I have been brought up on a farm, and always lived on one, and I dread to see the soils here become as our soils are in the western portions of the State. It does seem to me as though you would in time see the folly of raising so many potatoes to go out of the country. Brother Parker has just said he believed the soil to be as near inexhaustible as could be, but it seems to me that those gentlemen who have moved from the western part of the State would be pretty confident, judging from our lands that way, that there is danger of exhausting your soil here. One gentleman said, this afternoon, he could raise potatoes for twelve and a half cents per bushel. I hardly see how the gentleman can tell; he does not know what it takes out of his soil. While he is growing his potatoes year after year, his soil is going

steadily back, and if he raises potatoes long enough he will find they will cost him one dollar and fifty cents a bushel. I think if the farmers hereabouts would go to raising stock beef, sheep, &c., they would do well. You have the hay and feed. You ought to, and I believe you can, raise two oxen to our one; two pounds of butter can be made here to our one; two pounds of cheese to our one; two pounds of wool can be produced to our one, and by so doing, and less exhaustive cropping, you can keep the soil where it is.

Mr. TOWNSEND, Aroostook. I think it is well enough to crop with potatoes for the first or perhaps the second time after clearing the land, although I have no doubt that after the stumps have become rotten you could get a good crop of potatoes, or nearly as good as before. Some seasons we can raise more grain and more potatoes than we did the year before, and then the next year perhaps less, and the next more. It is not owing to the soil, but the season. But I believe that the raising of potatoes year after year will certainly exhaust the soil. But in taking one crop of potatoes we take it as profitable as we take any crop that we raise.

Mr. LELAND. I think that those who have surveyed the State of Maine, teach us that the soil in Aroostook county is different from the soil in any other part of the State, but that this soil cannot be exhausted is probably incorrect. This same theory was held by the early pioneers. They believed that the stubble plowed into the soil would return as much to the soil as the crop took out. That was of course an error, as they found in time. I have been looking through your starch factories, and have seen the large amount of fertilizing element which goes to waste. Is it not possible for this waste element to be saved and used as a fertilizer? I feel sure of one thing, if you do not keep your soil in its present condition you are to blame. You can do it, and I think if you continue to take off your crop with the expectation that your land will retain its strength and productiveness, with no return of manures, &c., you will be greatly in



error, and perhaps you will see it in years from now, when it is too late to remedy the evil.

Mr. PARKER. I am glad to hear these words of warning coming from these men, telling us how their farms have been exhausted, and how hard they have to work there to produce crops not more than one-half as good as what we can raise here without any outlay. We should take these facts to ourselves, and endeavor by all means to retain our soils as near the virgin state as possible. You outsiders seem to think we are ruining our farms by raising potatoes for the starch factories, and this is the fifth year we have raised them for that purpose. Five years ago there were but few farmers in this town, Presque Isle and Fort Fairfield. Some of the land had been cleared fifteen or twenty years, but the stumps had not all been removed. Farmers had commenced to stump their lands, and by so doing they have, to-day, farms some of them nearly free from stumps. I fully believe we should go into stock raising on a larger scale.

## MUCK: ITS VALUE AND USE.

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BY GEORGE E. BRACKETT, BELFAST.

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With the cry coming up from all parts of our State, from Kittery to Quoddy and Presque Isle, of the "running out" or decrease of fertility in so many of our cultivated soils and fields, it is every season becoming the paramount question, what shall we do about it—with what material and how shall we stop this deterioration and increase the producing capacity of our acres. In other words, what is the cheapest and most available means generally at hand to recuperate our failing and worn out lands.

We are all aware that barnyard manure will produce this much desired result effectually and permanently, but the fact that we have not enough of it, and cannot obtain enough for our purpose, effectually disposes of this point. So far as it goes, all right, but what shall we do for the deficit? Let us look into the subject a little, for it is one of vital importance to the agricultural well-being of our State. It means all there is between thrifty paying crops and fat fertile fields, and future barren acres and starvation returns therefrom.

For years it has been a pet theory, or rather a supposed to be fixed fact, that nearly every farm in Maine possessed a magazine of wealth for plant production and soil recuperation in the innumerable deposits of muck which nature aided by art has so generously "dumped" as it were, here and there in the hollows and lowlands; and muck and its value, etc., has been the theme of many an agricultural article and lecture, and not a few times has this unctuous subject been discussed by this Board, until, notwithstanding occasionally some daring innovator would strike a sturdy blow in opposi-

tion, we had almost come to believe that here was the great panacea—and many of us have talked and acted accordingly. But right here and now while we are in this contented mood comes in a bold champion, the *Scientific Farmer*, and with inoclasic stroke would demolish all our ideas by an article under the caption, "Is muck useful?" And after this satirical query, it goes on to assert in effect that the plant-food contained in a ton of dry muck is worth one dollar, and if the muck is moist as when it is dug, it is worth about three cents per ton, and the inference is that ordinary muck cannot be used profitably as a source of supply for plant-food, as the labor expended in its preparation would purchase far more plant-food in the fertilizer market. And again, though it is recommended as an absorbent where an absorbent is required, it is further recommended to haul it from the bed to the field, rather than to the barn for composting, if it is desired to use it to change the physical character of the soil.

Now if these opinions and ideas are true we are all afloat again, for who can afford to spend his time digging, hauling and preparing muck, if it is worth only three cents per ton raw and one dollar per ton dry. But it occurs to me that there is a main idea and fact in connection with the subject which has been overlooked. Just as in society there are men and men, so in the list of deposits there is muck and muck, and what one farmer carts into his fields or his barnyard as muck may be a very different material from what his neighbor or brother farmer in a distant part of the State obtains for the same purpose. There is liable to be a great difference in its quality and value, and I have no hesitation in saying that some muck, or so-called muck, is not worth the handling. Hence it seems to me here is one main cause of our disagreement and the different opinions of writers as to the value of muck for a fertilizer. Muck is a deposit of decaying or decayed vegetable matter, usually found partially or wholly under water, but its intrinsic value must depend largely upon its location or time of deposit and the elements which enter into its composition. None of us would be at a



loss to decide which we would prefer for a fertilizer, a ton of leaves from hard wood trees or a ton of pine leaves, so the reason for the difference in the quality of muck is easily accounted for, from the different articles of which it is formed.

Again, this variation in its quality renders scientific analysis almost useless except for particular deposits, as the component parts or elements of a specimen from one bed may vary largely or entirely from that of another. Our leading agricultural chemists have analyzed muck and the tables are open for inspection, and as a whole they are certainly favorable to the muck.

As it is admitted that barn manure is the most valuable fertilizer as a whole, and must be the farmer's main reliance, let us see what the doctors say in regard to the comparative value of the material under consideration. Prof. S. W. Johnson has compared, by chemical analysis, muck to barn manure, and given as the result of the comparison, that muck contains in a given quantity about one-third more organic matter, an equal amount of lime and nitrogen, but is deficient in potash, magnesia, phosphoric and sulphuric acids. These deficiencies of muck, as to composition, he declares may be corrected as regards potash, by adding to each ton of it twenty pounds of potash of commerce or one hundred pounds of unleached wood ashes; as regards phosphoric and sulphuric acids, by adding twenty pounds each of bone dust, and plaster of Paris. In fact, he says, the addition just named will convert any fresh peat (muck) containing not more than 80 per cent. of water, and not less than 20 per cent. of organic matter into a mixture having as much fertilizing matter as stable dung, with the possible exception of nitrogen. By this it would seem it will hardly pay to handle barnyard manure, if it will not pay to handle muck, for certainly the muck is only secondary in value and importance to the barn manure.

But there is yet another matter in connection with the use and value of muck as a fertilizer which I wish to take into consideration, as I think it is really the most important, and

it is a point which is largely or almost entirely overlooked. It is the use and value of muck as a soluble, if I may so term it—as an element or agent applied to soils to increase the amount of plant-food by combination with and action upon elements already present in the soil, but not in a condition for use. All soils are rich to a less or greater extent in plant-food which is in an insoluble condition, locked up as it were and not available. For instance, most soils contain nitrogen, potash and phosphoric acids in insoluble forms, and all these are valuable and effectual fertilizers, but they require something to put them in a condition for plant-food. Now therefore anything that will render these substances or a portion of them soluble, or capable of being taken up by plants will produce the same result so far as producing crops by the soil is concerned, as though manures or fertilizers were applied directly.

Nature's alchemy yearly changes and renders available for plant-food portions of these stores of potash, nitrogen and phosphoric acid locked up in the soil, by means principally of the action of water and carbonic acid gas on the rocks and minerals. Hence the necessity of a supply of carbonic acid gas, the principal source of which in the soil is decaying vegetable matter, and herein is the value of muck made apparent. Our old, long time cropped fields are deficient in organic matter, which has been appropriated by plants and perhaps hauled to market, and being thus deficient but little carbonic acid is generated, therefore but a small amount of the food elements of the soil can be made soluble or capable of being assimilated by plant growth.

Now that need must be supplied or the crop returns will be meagre, and just here, we contend, comes in the most important use of muck—to increase the amount of organic matter in the soil, thereby producing a supply of carbonic acid which by contact renders the inorganic materials soluble. Supposing even that muck of itself will not pay the cost of handling, yet if by its use a portion of the insoluble plant-

food of the soil can be made available for plant use and food, it will more than pay to dig, haul and use it.

So notwithstanding the unfavorable opinions expressed, we are not yet ready to discard muck from the list of paying fertilizers, and our advice to every farmer still is to secure an annual supply, where circumstances are favorable, and although it will of course vary in value, according to its location and composition, yet we honestly believe there is not a muck deposit in Maine, within reasonable distance of cultivated lands, but is of more than sufficient value to pay for applying it to the hungry fields, and especially to sandy, gravelly and leachy soils which are so deficient in moisture and vegetable matter.



## STOCK HUSBANDRY FOR AROOSTOOK COUNTY.

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BY HALL C. BURLEIGH, FAIRFIELD CENTRE.

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That the production, management and disposal of our live stock is the most important interest of our noble State will be clearly proved without any argument from me, I trust all will willingly concede. That these interests are but poorly cared for and often sadly neglected, is patent to every observing mind, and is a source of painful regret to every lover of these noble animals, which an all-wise Providence has given for our use, comfort and pleasure, and holding us, their owners, accountable for their usage and comfort.

Who of us can fully appreciate the value of the gentle cow, whose supply of milk and butter form so important a part of our daily food ; or the patient ox, whose whole life is devoted to bearing our burdens, doing the work of a score of men, and at the end of which, if properly cared for and fed, will in return feed a multitude of people ; or the noble horse, this most abused of all the animals given us, so loving, so patient, always willing to do our bidding, if properly reared and trained. And last, though not least, as regards a nation's wealth and prosperity, the meek-eyed sheep, with its golden fleece, bringing wealth in proportion to the interest taken in this branch of husbandry. And although I do not propose to go far into statistics to prove any arguments that I may make, yet it will be necessary to give a few figures to show the importance and value of the live stock interests, as they now exist, and what they may be by judicious management and care ; and in doing so I shall draw largely from Commissioner Watts' Report of 1877, and my own experience as a stock raiser, and general observations.

The value of the live stock in Maine, January, 1877, in round numbers, amounted to \$18,000,000; while the value of all the cereals raised in the State, in 1876, amounted to but \$3,507,840; to which add the enormous potato crop of that year, and we have \$3,698,840 more; giving a total value of all the grains, corn and potatoes of but \$7,204,680. Yet the hay crop of the same year, (the material for growing our live stock) reached the enormous amount of 1,264,800 tons, with a market value of \$14,165,760.

Thus we see that the State of Maine, occupying as small a position as she does as an agricultural State in our country, produces more than one twenty-fifth of all the hay grown in the United States and Territories. This amount of hay raised gives us three tons of hay to every horse, two tons to every horned animal, and one ton to every five sheep in the State, with a surplus of 184,000 tons.

That this vast amount of forage must be fed to some classes of our domestic animals, and all the manurial substances utilized, in order to keep up the fertility of the soil and thereby make farming a success, experience has fully demonstrated; and the salvation of Maine as an agricultural State depends very largely, and I might almost say exclusively, upon this point alone. Then the question arises: How and to what kinds of farm stock shall the hay be fed?

As horses are first mentioned in the columns of agricultural statistics, I will also first speak of them here. Maine is credited with having 80,100 of this class of stock, which are kept at an enormous expense. Reckoning but two tons of hay per head, per annum, at the estimated price, and we have a cost for hay alone of \$1,794,240. To this add the value of other feed, which will amount to as much more, and we have for cost of feed alone, \$3,588,480. And what do we get in return? But I fancy I hear many saying, How are we to get along without the horse? In reply I will say, not at all! We need the horse, but we need a different horse from that generally raised—yes, I might say almost exclusively raised—in the older portions of the State, and not more than one-half

the number we now have. Now don't be alarmed at this statement, for I repeat this assertion, and it makes no manner of difference to me who takes the opposite: We don't need in the State of Maine, in our present undeveloped condition, over 50,000 horses, and not one of them a "track trotter." Three-fourths of the horses in the State to-day will never pay their owners twenty-five per cent. upon the cost of raising. Why? From the very fact that there has been no judicious system pursued, except by a very few, in this branch of husbandry.

The fast horse mania has fastened itself upon us like a nightmare, not confining itself to the young, or the sporting man, but it has swept over our State like an epidemic, slaying its victims on the right hand and on the left, drawing many of our best farmers and business men into its vortex. Scores and hundreds of our farms which fifteen years ago could show from two to ten fat steers and oxen which were ready money any day in the year, with a good dairy of cows and a thrifty flock of sheep, to-day can boast of one, or two at most, neglected and half-starved cows, (the only horned cattle on the farm,) with no sheep, because they had been sold to pay the taxes. But the farmer can show from three to ten horse kind, whose boasted ancestors trotted in the thirties, and he is hoping they are going to trot sometime, and if they do, he can lift the mortgage that he has had to put on the old homestead to raise money since the cattle were sold.

Farmers of Aroostook, profit by the sad experience of your brothers in the older portion of the State. Breed less horses. Use the same sound judgment that you do in breeding cattle and sheep. Let size, style and the general good qualities that are combined to make up a useful horse, be the ideal to breed from, and if the horse you raise can travel ten miles per hour, it is fast enough for all practical purposes.

The adaptability of the different breeds to different localities and wants, the breeding and rearing of the same, is a question of vital importance. He who has had the credit of



being the wisest man that ever lived, said many centuries ago, "Where no oxen are, the crib is clean; but much increase cometh by the strength of the ox." And I think there is just as much wisdom in that saying now as then, and that is just as applicable to the farmers of Aroostook—aye, and all New England—as it was to the ancients.

The State of Maine should raise and dispose of twenty-five thousand fat steers or oxen annually more than she now does. There is no team that we can do our farm work with at so small expense as with good, well disciplined oxen and steers, there is so little outlay to fit up the ox team for active operations, while the cost is very much larger for horses, as well as for repairs.

Not that I would discourage the use of horses on the farm, by any means; but there are many farms, and I might almost say a majority of the farms in the State, where two, three and often more horses are kept where but one is needed, and if their places were supplied with first-class oxen and steers, it would be a source of profit to their owners and a real blessing to the State. There would be less talk about hard times, less expense for trotting gear and blacksmiths' and harness-makers' bills, less time devoted to the race-course by our young men, less debt and failures. The fast horse business is the bane of the State, and has subjected it to loss that is second to no other event except our late war. The trotting horse mania has cost the people of the State millions of dollars, and the end is not yet. And who can wonder at the infatuation, when nearly every leading agricultural society offers so much larger prizes to encourage the raising of trotters than for any other class of live-stock.

What breeds of cattle shall we keep? I almost fancy I hear from some interested listener this query. Now I shall answer this question with the fewest words possible. Be thoroughly convinced in your own mind what breed is best adapted to your locality (all things considered) and your wants. Then get the best of that breed that you can, take the best possible care of them after you get them, and with an ideal of a perfect animal

in your mind, breed for it, make the subject a study, and if you engage in breeding and rearing animals in this manner, making careful selections, nine cases in ten you will succeed.

The reason why so many make a failure in stock raising is, they enter into it upon the excitement of the hour, without any practical knowledge whatever of what they are undertaking. They attend a fair, perhaps, and see a noble animal of some particular breed, raised at enormous expense for show purposes, and without any further investigation as to the relative merit of the breed, rush in and buy, loudly declaring that they have found the right breed, and as loudly denouncing all others, thereby advertising their own folly. But I take the ground that all these pure breeds of cattle in New England have their good qualities and adaptations to certain localities and wants. While the noble Shorthorn is adapted to the luxuriant grass regions of our country, and is highly prized by its many admirers as a beef animal, and when crossed with other breeds fine working oxen and good milkers are often produced, and in many of the older portions of the State the Shorthorn has been the "foundation stock," and a good foundation they have made, yet the beautiful little Channel Island cattle, acknowledged as the dairy breed, have made great inroads into the older counties and have endeared themselves to the dairyman and the lover of golden butter and richest cheese. Yet with all her claims as *the dairy cow*, I would not by any means be understood to recommend every farmer to go into Jersey stock. There are other considerations which are of quite as much importance to the general farmer as dairy qualities. Then comes in for a claim to our attention the sprightly Devon, which has won for itself quite a reputation in the midland counties of England, as well as in some portions of our own country; well adapted to the hilly portions of any country with a dry, even temperature. The Devon ox is highly prized in Massachusetts, Rhode Island and Connecticut for the road and farm labor, and there are claims made for the Devon cow as a milker, which I may speak of before I close.



The next breed which I will speak of, and whose popularity seems at present to be on the wane in New England, is the Dutch, or Holstein. With their gigantic proportions they may be well adapted to the low marsh lands of Holland, where the coarse grasses grow in such abundance that they may easily get their fill, or in the famous grass regions of Illinois and Kentucky, they may be useful. But for rugged New England, I should not recommend them, although for quantity of milk they may be *ad infinitum*.

The Swiss cattle, which have been the subject of much criticism, have some good qualities,—which I have not overlooked, as I have seen them year after year,—as a hardy breed, of very fair milking properties and early maturity, bred as they have been bred beneath the white-capped Alps, whose ever melting snow waters the mountain sides and valleys below. They seem to be a breed well adapted to a country like ours.

And last, though in my opinion not least, comes for our consideration the Herefords, one of the oldest, if not *the* oldest acknowledged breeds in England, the genealogy of which I shall not further speak of here. And first I will say that the improved Hereford cow, like the Shorthorn and the Devon, are not acknowledged as great milkers, although there are families in all these breeds that are quite good, and I might almost say excellent dairy cows. But the half-breed cows are quite often very good at the pail. As a beast of burden, for heavy draft and long roads, the Hereford ox is unsurpassed, of great powers of endurance and very tractable. The Herefords cross extremely well with the Shorthorn, and the progeny not only partake the early maturity for which both breeds are so noted, but also the fattening qualities of the Hereford.

And now I have reached a point in my remarks where I shall have to tread lightly, or take the shoes off my feet. I feel, as I remember the many choice flocks of sheep that I have seen from Aroostook, that I should be the listener and brother farmers here be the speakers. The Aroostook



farmers, I am glad to be able to say, have taken the front rank in this branch of farming in our State. They have made mutton the first consideration, then wool, which I consider the true policy for the New England sheep raiser. When a pound of early lamb or two pounds of fat mutton will bring as much as a pound of wool in Boston market, it is poor policy to sacrifice the mutton qualities of our flock and put ourselves on an equal footing with the Texas or California sheep raiser. Then let me say, brother farmers, that I congratulate you upon the wise choice you have made in the selection of your breeds of sheep, and may you go on until your flocks shall rank second to none, either on this or the other side of the Atlantic. England's hungry mechanics by the tens of thousands want your mutton and your beef and are willing to pay fair prices for it. We can compete with their stock raisers successfully, if we will but use the same sound judgment that they do in selecting breeding animals. We have the stock to make the selections from and the feed to grow and fatten them, with the means of easy and cheap transportation.

And now, brother farmers, in conclusion let me say that stock raising is a subject that has been and is near my heart and has engrossed a large part of my attention since my majority, and in fact for years before. I can almost say that I have made it a life's study. And here let me say that I have ever tried to keep clear of that bigoted prejudice that has been so detrimental to many of our breeders' interests and made their life work almost a failure, that of thinking and acting upon the principle that my cattle were better than those of others.

In breeding, do not enter into it at hap-hazard. Have a definite idea of what you want. If you intend to make dairying your leading business, breed from the best Jersey bull within your reach and rear your heifer calves for a special purpose, the dairy. One first-rate dairy cow will be more net profit than three ordinary cows, while the pleasure of having such is of no small account.

If working oxen and beef raising are to be your specialty, patronize the best Shorthorn or Hereford bull possible, according to your fancy of the two breeds. Select with especial care heavy fleshed, choice quality animals, and in order to carry this branch of husbandry to the highest point of perfection, and thereby make the greatest gain, never allow the animals to lose their calf flesh. "Daily gain," should be the motto from *birth* to *death*. If he is a public benefactor who causes two blades of grass to grow where but one grew before, what shall be said of him who grows two pounds of fat, juicy beef or mutton upon the same amount of feed that has grown one before? And yet this is possible. We can not only raise to sell twenty-five thousand more oxen in the State of Maine annually, worth \$1,250,000, but we can by judicious selections and proper care and management enhance the annual profit on the number now kept fully as much more, making a difference in favor of the farmers of Maine of \$2,500,000 annually in this branch of husbandry alone. Is not this worth looking after? Is not this a matter of sufficient importance to demand our attention? Yet this is not all the benefit to be derived from a departure from our present mode of stock raising. It may be the means of turning many of the farmers' barns back again from the training stable to their former and more legitimate occupancy, that of being a stock farm indeed; and what is of vast more importance, encouraging the boys to take a lively interest in this branch of industry, which will be a source of pleasure and profit to them and a blessing to our country.

Brother farmers of Aroostook, yours is a glorious heritage. Nature has been lavish with her gifts. I am more than pleased with your country. I am delighted, and with Sheba's Queen I can truly say, the half has never been told. Yet I would say, let the watchword be for every farmer and every lover of our cause, *Improvement*. Send the word all along the line, until it echoes and re-echoes around every fireside in the State.

## SHEEP HUSBANDRY FOR AROOSTOOK COUNTY.

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BY GEORGE FLINT, NORTH ANSON.

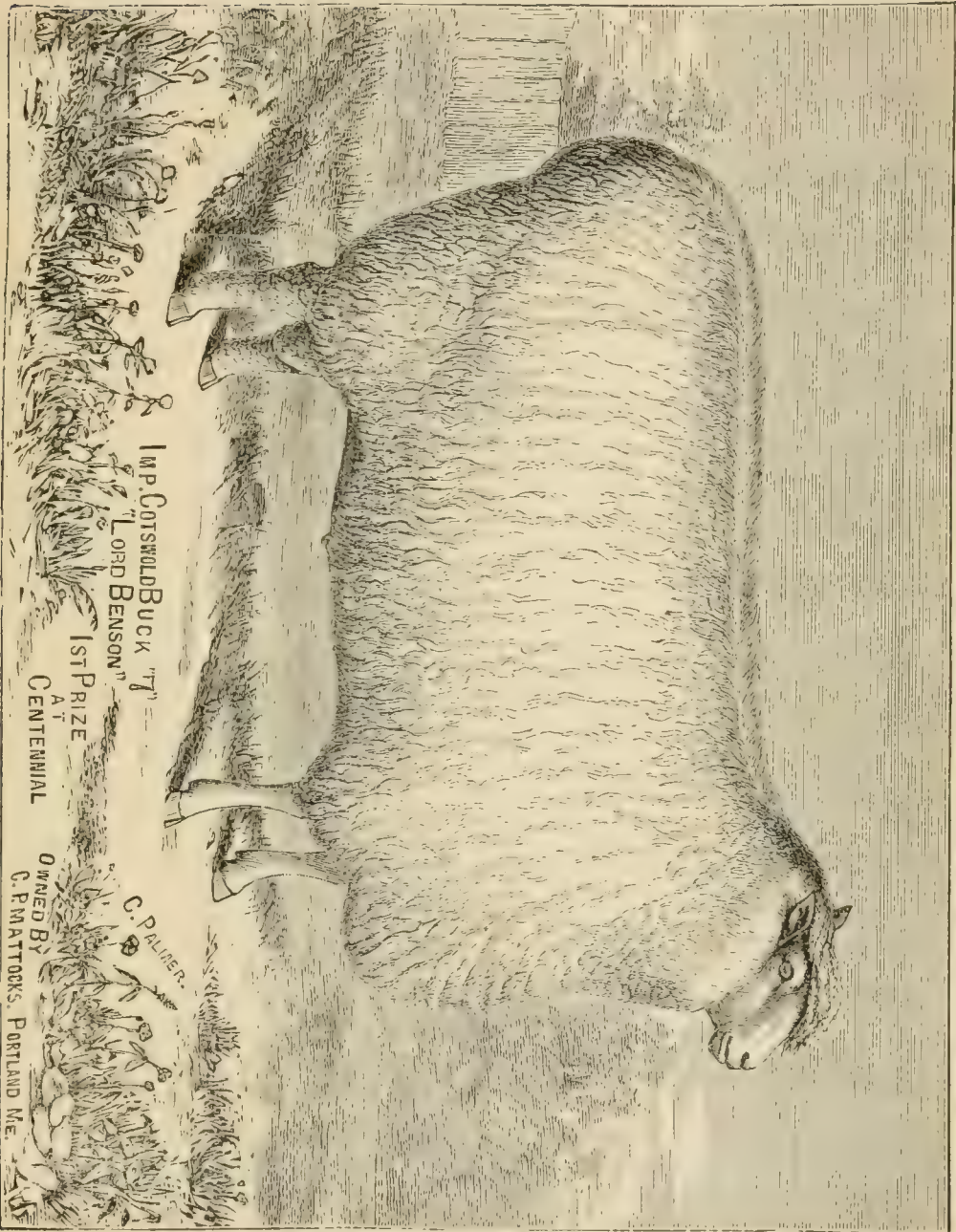
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It is very convenient in all matters under discussion to receive ideas which can be proved as clearly and concisely as a demonstration in geometry. In farming, we want to know what to plant, how to plant, and the result; but this is impossible. The difference in the soils, the seasons, and in the previous management, combine to vary the result. General principles only can be learned. The application must be varied according to every man's means and surroundings, guided by judgment, skill and executive ability.

Farming is not and never can be an exact science. Every varying shade affects the picture, and circumstances beyond our control will often determine the result. It is unfortunate that the first settlers of a new country practice an exhaustive system of tillage, thus leaving worn-out farms to succeeding generations. It has always proved bad economy to sell hay, grain and potatoes. No country ever did it and prospered, and no country ever can do it and increase its wealth. The products sold should be such as will bring the largest income with the least impoverishment of the soil. In this, sheep husbandry comes to the front and bears off the prize. It is not a business in which a novice can win; but with study and effort any one can make progress with varying results. Both knowledge and judgment are required in selecting stock and crossing breeds to produce animals of desired qualities. One should understand the habits of sheep, their disposition and temperament, in order to know their wants, and derive from them the greatest profit.

Here in Aroostook county you have all the requisite conditions of first-class sheep husbandry. You have a new and





Imp. Cotswold Buck "T"  
"LORD BENSON"  
1ST PRIZE  
AT  
CENTENNIAL

C. PALMER.  
OWNED BY  
C. MATTOCKS, PORTLAND, ME.



fertile soil, furnishing abundance of tillage and pasturage ; with prudent husbandry, you have every condition that nature can furnish. If you do not succeed and make it profitable, it will be contrary to all past experience.

The particular breed or class of sheep, matters little, compared with their care and management. There is an increasing demand for mutton and for the long and medium wools that seem to point to the larger classes, suitable for mutton, having care not to sacrifice the wool by so doing. A good mutton sheep may as well have a good fleece of wool as a poor one, paying all costs as it grows, and leaving the mutton as net gain. In Dodge's report of the International Exposition at Vienna, it appears that the Merino crosses, with sheep of larger bodies and longer wool, combine qualities that will meet our market. The same report says: "The Merino element is so prominent in Austria that the growing demand for better mutton, is beginning to be met, rather by cross breeds, than mutton sheep of full blood." Cotswold merinos are mentioned, "having a girth of nearly six feet over the wool; with fleeces at eleven months old, four and one-half inches in length, finer than the Cotswold, with much of its lustre."

These points are brought before you to prove that sheep are capable of being bred to any desirable point of excellence. If the varieties you now possess do not suit, feed better, and select your stock animals with a view to the result you wish to attain. Profits are light in careless breeding of any stock, and no improvement in price may be expected, where you compete with ninety-nine men of every one hundred around you. You must aim at better results; decide on what you want, and breed with that want constantly in view.

Distance from market can in a measure be counterbalanced by the amount that can be obtained. He who can afford to go into the country one day's ride to purchase one car-load of mutton, can afford to ride two days, if he can purchase two car-loads. Capital is always looking for a profitable investment. Value of different products change as facilities



for markets change, and old-time farming should be changed to meet the demands offered by new means of transportation.

In conclusion, all care in selection and discrimination in breeding will result in disappointment, without care in providing food of desirable qualities to bring out all latent powers for wool and mutton. To accomplish this, increase your stock to the extent of your hay and grain, provide shelter for winter, raise roots without limit, and feed bountifully; thus bringing the animal to early maturity and to the owners quick returns.

#### DISCUSSION.

(Following the Papers of Messrs. Burleigh and Flint.)

Dr. LINCOLN, of Washington County. I fully agree with Mr. Burleigh on the horse question, and think a great deal of money is being lost by the neglect in raising oxen for farm work. It can be better and cheaper done with oxen than with horses. The outlay is very much less, and if an ox be injured, he can be made beef. If a horse is hurt, he is worthless. In our portion of the State, on our rough, rocky soil, cattle can be used to much better advantage. To be sure we have some very good horses, but the majority of them are not adapted to farm work, cannot do as thorough cultivation. I saw a few days ago, at the County Agricultural Society's meeting, plowing—deep plowing—done with cattle. The horse is a favorite animal with the farmer, or he would be used less. I think Mr. Burleigh has pretty thoroughly exhausted the subject, and he is excellent authority. I believe sheep husbandry is a subject you ought to consider well. I do not see why it would not be a very successful branch to stock raising here in this county. Mr. Hayes says the State is very well adapted to sheep raising for the mutton market, but the best breeds of sheep for this county I am not able to state. But the kind which grows the best wool and mutton is the most desirable for raising.

Mr. HAYFORD. We are feeding cows that do not pay the expense of pasturing and the hay they eat. Were these cows fattened and sold to the butchers and their places supplied with real good cows, even if they do cost forty or fifty dollars, would we not be the gainers thereby? I think so. You must manage and care for your stock, no matter what kind you are raising, but of course the better stock you have the better returns you get from good care and good management.

Take the dairy subject. To-day there are many farmers around this village who are keeping cows year after year that pay no profit whatever. The same is true of beef and of our sheep. What we want to do in the stock business is to strive to know what kind of stock to keep and how to care for it. Many farmers cut a great deal of hay, feed it out, and save no profits. If they would study the business more thoroughly they would get eight or ten dollars per ton in place of three or four for their hay.

Brother farmers of Aroostook county, we have the members of the Board with us, and we can learn lessons to-day of lasting benefit. I really hope all farmers in this county interested, will come to the meetings of this Board, and will remember what information they receive.

Mr. PARKER of Aroostook county. I think it is a mistaken idea which some farmers have, all over the State, that we can compete with the West in beef, wool and mutton. We cannot do it, in my estimation. I think the wool crop to be one of the most productive of any in the State; farmers get as much money out of it as from any other. Mr. Burleigh said in his remarks that it was one of the greatest evils in the State to use and keep horses as we do. We don't want so many horses. He is right about the matter. We want to get rid of some of these worthless horses and keep more stock of other classes. There are farmers about here who keep horses where they should keep none, but keep oxen in their stead. If farmers would keep oxen, and less horses, they could farm at a greater profit than they do now.



Grass grows abundantly with us and we can well afford to keep plenty of good oxen, beef cattle and cows. I cut the first fifty tons of my hay at less than one dollar per ton, and I ask the farmers of Aroostook what branch of farming can be pursued where they can get one-fourth the profit I can by my hay. There need not be a ton of good hay cut in Aroostook that will not pay eight dollars per ton, if cut well and at a proper time. Years ago farmers were not ashamed to take a yoke of cattle and go to mill or haul their produce to market, but now it is different. A farmer now would rather hoe potatoes than take a yoke of oxen and drive ten miles to a village, but he will take a pair of horses and drive them that distance and seem to relish it greatly. He should, on the contrary, feel proud of a good yoke of eight feet Durham or Hereford cattle.

In regard to sheep raising, I notice that everybody who has spoken has an idea that our county is well adapted to the raising of sheep. I think it is so, but in order to raise sheep successfully it must be managed as a business, carefully. We have a disadvantage here which you do not have on the sea shore, and that is in regard to green feed. With you on the seaboard, during the winter, the sheep can get more or less green grass, while here, from about the first of December to the middle of April they do not get a green thing. Our farmers have never made any preparation to feed their sheep anything but dry hay and dry provender during the winter. This is a mistake. They require a change of diet. In Canada you all know they raise ruta bagas in large quantities to feed their sheep with in the winter. Last winter I harvested about one hundred bushels. Every farmer can raise them as well as not, if he will, and twelve hundred bushels of turnips would be a great help towards carrying through two or three hundred sheep, and in the spring those same sheep would be good mutton. We should bear this in mind. I think that sheep have need of green feed in the winter.



D. J. BRIGGS of Androscoggin. If a young man starts farming with a very small capital and makes sheep husbandry his aim, he is sure to be successful and a rich man in time. For the last thirty years it has been more profitable than any other branch of farming. Wool from 1850 to 1860 was forty cents; from 1860 to 1870, forty-nine cents. Buy sheep when you purchase not only for wool but of good mutton qualities. The Hampshire Downs are very handsome sheep, hearty, quick to mature, good bearers of wool. The Cotswold is one of the leaders of the kind, large sized sheep, with thick, heavy fleece, well adapted to living in this climate. They will succeed well in almost any situation and will produce a good amount of wool. They sometimes reach the weight of eighty pounds.

The Oxford Downs are a class of sheep a cross with the Cotswold. They are rather delicate sheep, on account of wool being open on the back. Sheep must not be cheated out of their feed. It is well understood that we must obey the laws of want and demand. I was talking with a hotel keeper in Boston, a short time ago, and he told me they used four carcasses of mutton now where they used one fifteen years ago, and if that be the case we ought to raise twenty-five thousand more mutton sheep in the State of Maine for the consumption of large cities. We can raise twenty-five thousand more as well as not, and I believe that we might in ten years liquidate the State debt by so doing. Farmers are too apt not to select the best sires as they should. I think I can tell by the looks of the sheep whether the best sires are used or not. Every man going into sheep husbandry has got to make his own flock by cross breeding.

WM. HOULTON of Aroostook. Some gentlemen have said we raise the best sheep in our county for mutton. It is a fact that we can raise good ones. I find, however, where we flock them together they are not so good, say forty or fifty in a flock. If sheep can run with cattle and have first-class feed they are always fat and nice. But you separate them and let

them take the feed as it comes and I find they decline and do not do so well.

Speaking of working cattle and horses, Mr. Burleigh said he was heartily opposed to so many horses. I fully agree with him, and I think I shall keep on driving oxen. I have lived in this county seven years and have always had a pair of oxen. I am going to stick to them, too. I have never taken any great interest in dairying until this year. I have kept eight cows during this summer. I thought I would try and see whether it would pay or not. The first of January we began to keep account of our butter, and from that time into June we made seven hundred pounds of butter. We have also made half a ton of cheese and about another hundred pounds of butter since. We can do well in the dairy business, if we take the right care of our stock. Many farmers in this county manage their cattle so poorly that they had better not keep any at all. Some of them have to go forty or fifty rods to get water in the winter. Have to be kept in a barn so cold that it is not fit for anything to live in, with such treatment and management. I have my barn so arranged that the cows do not have to go out to get their water. I keep them in the barn all the time in cold weather and feed on early, good hay, and all they want of it. While they are in milk I feed a small amount of provender. I think we want to keep a sort of mixed stock, some oxen, steers, cows and sheep, and just as few horses as possible.

HIRAM MORSE of Aroostook. Brother Houlton says he has done well with cows. I have no doubt of that. He feeds them well, cuts his hay early, and cares well for them, and that is more than half. As to sheep, it is best for us, I think, as he said, to have mixed stock. We want to keep what will pay us best, and we have got to find that out by experiment and practice, little by little. We want good sized sheep and we want to keep them well. We do not want them hived up where they can have no choice of feed, but we want them to have a good chance and then they will do well. I agree fully with what has been said by Mr. Bur-



leigh in regard to horses. I think the State has been damaged by fast horses more than it will get over in the next twenty years. I do not like to see a man drive a yoke of oxen and sit on the load. The place for him is beside his cattle.

H. C. BURLEIGH. I want to say (as some one remarked that driving oxen made men bald headed) if driving oxen makes a man bald headed, I hope every farmer in the State of Maine will shed his hair. I do not know but some of the audience, and perhaps some of the Board, think I am a little severe on horses; but, gentlemen, I had the fever and I had it hard, and I found a remedy, and that was to let them alone; and I will advise every farmer in Aroostook to do the same, and build up your oxen; make all you can of them. Increase your dairy interests and encourage the raising of sheep, but do not have a tendency to raise fast horses. Some say, do not keep your cattle so well, fancy cattle are good for little or nothing; but I tell you fancy cattle pay. I say feed and use your cattle just as well as you can, and you will find it pays. I tell you every dollar you put out to secure good, large, handsome cattle pays.

Mr. LELAND. In Piscataquis county we believe we cannot profitably raise beef. But I believe, farmers of Aroostook, you can raise beef successfully, more successfully perhaps than those of any other county. I admire your farms very much. I never saw an equal in the way of farming land, except perhaps in the Connecticut valley. And you have an excellent field here for keeping cows and making butter. It seems to me that the Ayrshire breed of cows would be just the animals for you here in this county. You have cold winters and short summers, and these cows are bred in a similar climate. You want them for that reason. The Jersey cow is tender and needs a great deal of care. I suppose you have several cheese factories in this county. I know of three. You want the Ayrshire for cheese. She has been made for cheese; just the cow you want.

In regard to sheep, I think it is best to pasture them in your cattle pastures. I see no reason why you cannot raise



splendid sheep here in Aroostook county, and I believe you can grow them, provided you act understandingly and thoroughly in the matter. By pasturing a large lot of sheep you are improving your pastures in fertility, benefiting your land very much. I believe in cattle, and I think farmers should do their work altogether with oxen. Following this course a man becomes a prosperous and successful farmer, provided he works accordingly in other matters.

Mr. PARKER. I wish to say this much in reply to the gentleman. There is no place for an Ayrshire in Aroostook. I did not suppose there was a place in the State for them, and if there is I am glad of it. There is a place for Jerseys, and there is a place for them here in Aroostook on our small farms. I would keep a Jersey by all means. But the Ayrshire, I do not know where I could be located to want an Ayrshire. It was my favorite at one time, but I found I had not a worthy kind of cow for a favorite, and that I did not want any such stock. We must furnish milk for the cheese factories and raise stock and raise beef for the outside market. We have a cheese factory in Maysville or Presque Isle, and the farmers about here run from four to twenty cows and put their milk in there. Some are raising ten, twelve, fifteen or eighteen calves to sell for beef. Our farmers in Aroostook have not got up to that yet. Now if they kept Ayrshires, instead of Durhams and Herefords, we could not raise good oxen and beef cattle. I know this.

Prof. FERNALD. I have a great respect for the horse, and I do not propose to sit here and have the horse put entirely aside without saying a word in his defence. I grant that for the greater part of farm work oxen are better, but there are offices which the horse can perform so much better than the ox, it would be useless to set this animal aside entirely. For instance, if Brother Burleigh this morning had been forced to come all the way from Fort Fairfield with oxen, I think we should have been obliged to adjourn until evening. You need horses in this county. You have to move about from one place to another.

I was told this morning that there are one thousand bushels in your grist mill to be ground, because the water is low ; and further, that some parties have to bring their wheat and corn, etc., fifty or sixty miles to mill. Don't you think it would be a waste of time to make such a journey with an ox team? Probably the cow is the best and most useful animal on a farm, but the offices which a horse can practically perform should not be overlooked. It is a part of the machinery of the farm, in fact, as much as a mowing machine and the rake, and other apparatus that is used in the cultivation of the soil, and I cannot see why the horse is not as useful as other animals used on the farm. I do not believe in fast horses ; I think, as Brother Burleigh has said, it has proved a bad business for the State to raise so many fast horses. But I must defend the horse and say I believe in the proper animal in the proper place, and I hope the farmers will decide for their own interest.

Mr. FLOYD. The Jersey has been hit pretty hardly by my friend from Piscataquis. He says they are not hardy animals. I wish to correct the gentleman and the people of Aroostook county in that respect. Many years ago I had the honor to live in the town with Dr. Holmes, who has done more for agriculture than any other man in Maine. I believe he was the first man who introduced the Jersey blood into the State of Maine. Mr. Henshaw of Boston sent him down two females and a male. I met him on the street a short time after he got them and he invited me down to see his new stock. He took them out, and they went down to the stream to drink, and it was a cold day and they came back shivering with the cold. He said Henshaw said they were tough and hardy. He did not spend his time in fixing up his stable. Dr. Holmes was never too careful of his stock. Well, the people did not seem to think much of them, but they began to increase on his hands. Nobody bought them. Did not think them good for anything until they saw they would live on the Doctor's hands, and then people came to the conclu-



sion if Dr. Holmes could keep Jersey stock they must be a tough breed, and so they are tough, hardy animals.

Prof. FARRINGTON. I am glad to see my friend Mr. Fernald use his voice in favor of the horse. I shall certainly be obliged to concur with him in that respect. In regard to stock, I believe each and every man should study the problem in his own mind and settle it satisfactorily as regards himself. For instance, I think a farmer should ask himself the question, Do I want a Jersey or do I want an Ayrshire? Decide the question as he thinks best for his own individual interest. And another thing in keeping stock, a great deal depends upon the person who has the dressing and care of the butter. I tell you, young men, one of the things you ought to think about is to get some one who will take good care of your dairy. And young women, one of the things you should prepare yourselves on is to successfully fill this position for some noble, honest farmer.

There is no calling in the world in which the question seems to occur so often, What shall I do? What shall I do in regard to this or that matter? as in farming; and very often farmers feel as if they must run to a neighbor's and ask for a solution of the question. If you follow anybody's direction you are liable to find yourself mistaken. Work the question out for yourself and decide as you think proper. I can cite some things in my estimation that would favor the horse, and then some things that would favor the ox. I think both are good animals and proper in their place, but I must contend that both are equally useful and necessary on the farm. The question is not whether oxen or horses are best, but Stock-raising in Aroostook. If a man excels in raising beef, that is his business. If he succeeds best in dairying, then that is his business. I undertake to say that while a man may raise oxen profitably, the same man may not be able to raise horses; while another man might do that who would fail to raise oxen. I think you will all see the question as it is, if you look at it carefully.



Mr. BRIGGS of Turner. I hope the farmers of Aroostook will not be led away by our scientific men. I think if they would double the number of sheep in this county, they would do a profitable thing for themselves. As I said before, I think it best to make a cross in regard to sheep, in order to secure the best kind for wool and mutton.

Gen. BROWN of Portland. I want to ask whether it is practical or profitable to raise stock in Aroostook county. I wish to ask, Is there money in raising beef, sheep and horses in Aroostook county, and I may add good mutton? We have heard a great deal in our part of the State as to the profits of such a business, and I think the reports are not exaggerated, from what I have seen of the county since being here. I met a drove of cattle and asked the price of animals, and was surprised to find them so low. If you can satisfy the people who would like to put capital in here, that they can make money, I think many more would come in.

Mr. HAYDEN of Aroostook. I have taken one hundred and ninety dollars out of my wool and lambs in one year. I will state this much in reply to the gentleman.

Mr. HAYFORD. I will try to answer some of Mr. Brown's questions. We can raise hay here and put it into the barn for one dollar per ton. Farmers in the western part of the State know how much it costs them to cut hay there and what their yield is to the acre. I think it safe to say that we can raise two yokes of cattle as cheap here as you in the older counties can raise one. Some of your farmers, perhaps, ask how is that? How can you get your hay so cheap? Well, after we get the stumps wholly or nearly out, we can put our mowing machines in and take down a large piece. We can put it into the barn at one dollar per ton, as I stated before.

Mr. BROWN. Does that include the labor expense of gathering the crop?

Mr. HAYFORD. Yes, sir. Three years ago this summer I had six men in my hay field, and from Monday morning till Saturday night we put sixty loads of hay into the barn. I paid the highest that year one dollar per day for help, and

farm help from sixteen to twenty dollars per month. Well, reckoning these men at about eighty cents, and their board at about fifty cents, I get my hay at about one dollar per ton. Owing to the newness and richness of the soil, we can raise beef cattle and sheep, I think, cheaper than they can be raised in any other part of the State.

Prof. FARRINGTON. When we come to the financial part of farming, and begin to take figures, we reduce agriculture to a science. The gentleman has said that with six men he could cut sixty tons of hay in six days. I wish to inquire what day he finished mowing?

Mr. HAYFORD. Friday.

QUES. You cut your hay mostly with machine?

ANS. Yes, sir, mostly.

QUES. And you used how many teams?

ANS. Two teams—that is, in hauling.

QUES. And you reckoned them in? you reckoned board and the use of the teams?

ANS. No, sir; nothing for the use of the teams, only board and labor.

Mr. FARRINGTON. I don't know as I care to ask any more questions, but I think that farmers make a great many statements that are made where they do not make full account of all expense. Mr. Hayford has not reckoned the wear and tear of machinery, carts, racks, and the almost numberless conveniences which he used, and upon which there must yearly be an expense to be taken into account. I am utterly astonished. It does seem to me, if everything was fully considered, it would put the cost higher. I have figures of my last year's haying with a crew of four men, two teamsters, one man to care for the stock, and one for farm work. We began, I think, the fifth day of July, and in eleven days we got one hundred tons of hay, and it was mostly done with student labor, and it cost to get that hay into the barn, three dollars and sixty cents per ton; and we thought we were doing a pretty good thing at that. It seems to me there must be some queer process, for I know I can work myself, and I

know the students worked, and it cost us three dollars and sixty cents per ton, as I stated before.

MR. LELAND. Might not some of that be accounted for by the fact that you are on a worn-out farm instead of in Aroostook county?

GEN. BROWN of Portland. I think the publication of these facts would be of much interest to farmers in the western part of the State. I had about eighty acres of hay to get last summer, and I had to employ a man at about five dollars per ton to get that. I could get no one who would do it for less. Therefore, I say the publication of these facts would be beneficial to the county, and might induce many to come here.

MR. PARKER. I think perhaps the best way would be to state what all our crops cost us. I will say, at the outside, our hay does not cost us over three dollars per ton to put it in our barn; our oats about twenty-five cents per bushel. We can raise big crops of wheat at twenty-five cents per bushel, barley at thirty-five cents per bushel; potatoes for about a shilling. I have raised them for thirteen cents.

MR. TOWNSEND of Fort Fairfield. I planted five acres of potatoes, and reckoning labor and everything, I estimated that they cost me only twelve and a half cents per bushel.

MR. PARKER. In regard to cutting hay, I did not realize we were talking with men who came from the State College, where they do not probably cut over fifteen hundred to the acre. You who come from the western portion of the State must recollect you are not coming to land like the land in older counties, but new, strong soil.

MR. BURLEIGH. It seems to me if we can grow beef down in our western counties, where our hay costs us from five to eight dollars per ton, that it must be profitable to make beef up here. I should think this view of the question would practically settle the query as to whether beef raising in Aroostook is profitable.

MR. STICKNEY of Presque Isle. I spent my life until I was forty years of age in Kennebec county, and I know about what is raised there, and I have been for the last eighteen



years in Aroostook county. I have watched farming pretty closely here, and I have come to the conclusion that one day's work here produces twice as much as the same day's work would in the western counties. And I have, I think, in making this statement kept within the bounds of truth and veracity. Mr. Hayford's statement I fully believe. He told me at the time what he has just related before this audience.

Mr. JOHN A. ALLEN. I will say that I can testify to the truth of what Mr. Hayford has said, and I guess I can give evidence of it. I cut twenty tons of hay, and I only put in ten days' work, and three of that number were by my little boy eleven years of age. What we need here is capitalists; and I think the gentleman from Portland, or any of his friends, would be perfectly satisfied with the results reached, by investing capital in either stock raising or general farming. We know we can raise stock cheaply here. Another point to be considered is, that we do not get a first-class price for it as things are now, and as it takes money to make those things better, we know if we had capital we could do more in the line of stock raising than it is possible to do at present. I am acquainted with a great many men who have come here with nothing but their hands, and who are to-day successful farmers. On the other hand, I know men who have made a failure simply because they have attempted to do too much with the amount of capital they had. I would say to all who have capital to invest, come to Aroostook and invest it in stock raising. Go at it intelligently and carefully, and I think there is no doubt that a man will be certain of success.

## DAIRYING IN AROOSTOOK COUNTY.

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BY J. R. NELSON, WINTHROP.

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The interest of dairying is not a new one. That it is a subject worthy of the most candid and thorough examination by the farmers of this county, I think need not be urged at this time. Aroostook possesses many advantages fitting it eminently as a dairying region. It comes within the oft-mentioned dairying belt; it offers the most favorable conditions for the keeping of dairy stock, and the manufacture of cheese and butter; its fertile fields afford an abundant supply of food for the winter needs of stock; and its summer pasturage is so luxuriant and continuous from the departure of the snow in spring until it falls again in autumn, that dairying, as a specialty, where transportation is available, must, if rightly managed, be a lucrative business. Her long winters are favorable for winter butter making, which is at the present time being successfully adopted by very many of our most prominent dairymen. Her summers offer a somewhat short, but favorable season for the manufacture of cheese. That the quality of her cheese is most excellent is shown in that sent out by the Nickerson factory at Houlton, which is equalled by very few factories in Maine. Its good quality consists in its fat as compared with that made at the Winthrop factory. The main difference is in richness. Now this is due in part, and perhaps entirely to a difference in cows. With a strong infusion of Jersey blood into the herds of Aroostook, not only could you make the best butter, but the best—the richest—cheese in the world. Nevertheless, if the growing of stock for beef and the general market is the main object aimed at this infusion might not be desirable. By having your cows come in milk in fall and early winter, winter

butter making and summer cheese making could be profitably carried on by very many of your farmers, and thus more profit realized from their cows than is the case when allowed to go dry through the winter. With improved methods of feeding the stock and handling the milk, together with the increasing demand and higher prices offered for first class dairy products this could be accomplished. Early cut hay well cured, from the best varieties of the grasses, prominent among which might be named clover and orchard grass, with meal, shorts, cotton-seed meal and roots, if fed to dairy cows, not neglecting to provide at all times an abundant supply of good, pure water, will produce good butter, and dairying as a result will prove a success. One of the most valuable feeds, both in its influence on the fertility of the land and on the condition of the stock and their milk and butter production, is cotton-seed meal. There is also no feed at present offered for sale that is so cheap in proportion to the results obtained from its use. Those who have feed it several years in succession, consider it indispensable. Dr. J. W. North of Augusta, made the statement last winter that while feeding corn meal and cotton-seed meal, equal proportion, during the month of February, there was not only an increase in the quantity of production of milk, but also in its richness, the number of pounds of milk required to make a pound of butter being reduced as low as 10.8. I am also confident that his cows, which I saw fed at that time, required a much less quantity of hay than they would had the cotton-seed meal been withdrawn.

But feed is not the only thing necessary to accomplish favorable results. The cows must have good care. Warm stables and cleanliness will also have their influence for good. During their long winter confinement the daily use of the card promotes the health of the cows. It especially promotes an action and condition of the skin, and thus has a tendency to prevent the evils resulting from the want of exercise. Sunlight is also conducive of health, and is of more importance than generally acknowledged. If con-



venient or even practical arrange the stable for cows on the south side of the barn, taking care that the rear be well glazed, and in winter with double sash. Experience will demonstrate the importance and favorable results of this arrangement.

Greater profit is always obtained, and more permanent results stamped upon any industry by exporting manufactured goods. The exportation of raw material for any considerable length of time is exhaustive. The raising of hay, grain, potatoes, and such bulky crops, for shipment, results in sapping the fertility of our farms. Is it not the part of wisdom to correct this evil before irreparable damage is the result? A ton of first-class, early cut hay, or its equivalent, should produce forty to fifty, or even more, pounds of butter, which of course could be shipped at much less cost than the crude material. The amount of profit, aside from the less cost of transportation, would depend upon the relative amount of intelligent care and forethought in making and marketing. The same train of thought, in a somewhat modified form, is applicable to the manufacture of cheese. Gentlemen, these suggestions are believed to be of importance and entitled to your early and earnest consideration.

I do not mean to say that it pays to produce two or three pounds of inferior butter to the cow, per week. Nor is it quite profitable to keep cows whose product of cheese is much below a good average. With cows that average 250 to 300 or even more pounds of butter, or 400 to 600 pounds of cheese, per year, the result is different. Not only will he who adopts the latter course obtain a large and excellent manufactured product from his crude material, but with care he will readily find a market for all such product at a good price, while the man who is satisfied with poor cows and a poorer product will be obliged to accept whatever price may be offered.

Farmers of Aroostook, just here is a point which to me presents itself as of vital importance. We are told of your farmers who are growing 3,000 to 5,000 bushels of potatoes,

the starch from which is being shipped from your county, the refuse perhaps floated down your beautiful streams. Also of those who are growing 1,000 to 2,000 bushels of oats, some at least of which are used to fertilize the more exhausted soil of old Kennebec. Now, gentlemen, seeing is knowing. Yesterday, for the first time, my eyes rested upon your fair fields, and I am prepared to believe that half has not been told of its beauty and fertility. But do not delude yourselves with the fallacy that continual cropping and removing such crops from your farms will not eventually impoverish your soil. The history of the Old World and the present condition of our own Western prairies are striking illustrations resulting from such a course. We were told yesterday that it was vastly easier preventing the exhaustion than restoring the fertility of a worn-out soil, which all, I think, who have had experience in renovating soils exhausted would be disposed to admit. Gentlemen, now is the time for you to heed the warning and escape the doom of those who are making an effort to restore fertility to the exhausted fields of the older portion of Maine.

Should I be asked what this may have to do with dairying, the answer would be, that indirectly it has very much to do with it. The question which presents itself for your consideration is, would it not be for your interest to send from Aroostook less hay, potatoes and oats, and more beef, pork, butter and cheese. Please consider, would not this be the part of wisdom, and would your farmers, as would those those who are to occupy and improve these fair fields in the future, not reap a benefit as the result of such a course?

## FARM CROPS FOR AROOSTOOK COUNTY.

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BY D. M. DUNHAM, BANGOR.

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The topic assigned me is of more importance than all the others. The time was when lumber was high and found so ready market that it would pay to buy corn from the west to feed teams to draw the lumber to market; but if it is started to the landing now it must be with teams fed upon the products of our own soil.

For the last twenty years much of the stock that has been raised in the western part of the State, has been fed upon feed raised one thousand miles away; but the cases are growing less every day in which this class of feeding will pay, as it is found that it costs much less to transport beef to our market than the feed upon which to make it, and we see in all our markets a very large per cent. of western beef, and for us to compete successfully in our own market even, we must certainly depend upon our own field crops. So with dairying, the time is past when the price of butter and cheese will allow feed for cows to be brought a very long distance, and we can only hope to succeed to the extent that the feed comes from our field crops, and as the food of man comes very largely from the flocks and herds, the feed for them is of the utmost importance. As grass is the natural food for cattle, and the only food that we can raise upon which they can profitably subsist, we may well say that grass is king, and put it down as the most important of the field crops. This being the case, we should be most careful in selecting the seed adapted to the soil and climate.

We know too little of the value of the different kinds of grasses, which can only be ascertained by careful experiments. We have too long been content to raise timothy



and clover (with perhaps a little sorrel, thinking that the sorrel would in some mysterious manner turn to white clover) without knowing whether other grasses can be mixed with these or whether they contain more or less nutritious qualities. But we must not think that because grass is king we must worship that alone.

I do not believe in special farming. I know it is very easy to say that it is easier to raise hay and buy all the rest, than to divide one's attention and raise the various crops that are wanted upon the farm; but I believe that such crops should be raised in Aroostook as will bring the most health, wealth and general prosperity to the Aroostook farmer and his family.

If the grass crop is first, the bread crop should certainly come next, and this in a new country like the Aroostook should receive the most careful attention of the farmer, for with bad wheat, barley, corn or rye, it is impossible to make good bread, and through the influence of bad bread comes all the ills that flesh is heir to. No really good and useful lawyer, doctor or minister, was ever raised upon sour, clammy bread; and of all occupations, the farmer should have a good, substantial, healthy and varied diet. Pork and beans, potatoes, beef and mutton, and bread, may be considered as the groundwork for good living; but a satisfactory New England diet cannot be had without preparations are made for pumpkin pies, apples, and the small fruits, which are so easily cultivated.

First, then, comes wheat; and I am glad to learn that quite a number in this county are raising winter wheat with remarkable good success. And from what I have seen and heard about the winter grains, I think this county is especially well adapted to their culture; and the Aroostook farmer should not be content without becoming perfectly familiar with all the elements necessary for success in this branch of husbandry. Perhaps it requires a little more care to raise winter grain, but from all the information that I can obtain from the different parts of the State, if it can be got through

the winter there is little danger of the midge, rust or frost, and by its ripening before the cool nights come on, the grain is harder and more easily cured than the spring grains. A sample of winter wheat shown at the State Fair, raised by Clarendon Butman of Plymouth, of which forty-five bushels were raised upon one acre, was really worth while to look at, and gave one the confidence that Maine is really capable of raising her own bread.

Twelve years ago, when our Penobscot Agricultural Society was formed, in the twenty-one towns included in the limits not a single half acre of wheat was sown. The society offered, by the direction of this Board, \$50 in premiums for wheat culture, which brought out quite a good competition. The reports were 78 bushels upon two acres, 40 bushels upon one acre, and several others averaging 33 bushels to the acre; and to-day I think that I am safe in saying, outside of the city and villages, those towns have this year raised their own bread. I am glad to learn that the grist-mill in this place, last year ground 23,000 bushels of wheat, and this year it expects to grind nearly double that amount; and it does seem to me, with the fertility and easy cultivation of the soil in this section, that western flour need not find a market here.

I believe that it is quite a general feeling in this place, that corn cannot be raised here. We used to think so in Penobscot county, but when this Board discussed the corn question, at Newport, and our county clubs took it up and offered a premium in gold for its culture, it was wonderful to see how many planted a piece of corn, and how generally successful was the result. I never saw better corn, either on the Kennebec or Connecticut rivers, and it was a little curious that at the huskings there was no lack of red ears! From what I have seen of the small pieces of corn planted here, I think that it should take a prominent place in the farm crops of this county.

Of course oats and barley will always form a conspicuous part in the field crops. The sugar beet is just now receiving a good deal of attention, and when we consider that our im-

portations of sugar alone is more, annually, than all the gold and silver dug from the mines in the United States, we may well look about us and see if this drain cannot be stopped. Of this we are sure, if we fail in finding sugar making remunerative we have food for cattle that is of very great value. And last but not least, we have the fruits, without which no good farm is complete. Ever since the ancient history of the first apple we find nothing that brings more happiness to the family than a plentiful supply of that fruit, and the immediate attention of the Aroostook farmer should be called to this subject; and while removing the temptation from the boys to slyly visit their neighbors' orchard, by having a plenty at home, and while we are waiting for the apples to grow, we should not forget the small fruits, which costs so little and bring so much happiness to the family, and may be grown in a short time.

#### DISCUSSION.

(Following the Papers of Messrs. Nelson and Dunham.)

Mr. FLOYD of Winthrop. It seems to me the president of your meeting struck the key note when he said the great object should be to keep up the fertility of the soil of Aroostook county. When I came over yesterday morning from Fort Fairfield I was impressed with the beauty of your fields, and I thought with such excellent fields and pastures you farmers about here ought to make nice butter and cheese and large quantities of it, and I suppose you do. Probably you do not sell much of your hay or other farm products, because they would not ship anything that would be profitable. I felt sorry as I saw your cart-loads of potatoes being hauled down to the starch factory. I followed down, and when I saw a great portion of those potatoes going down stream, I thought to myself—as other gentlemen have expressed in this meeting—that the fertility of the soil would soon be exhausted by such a course. I asked a gentleman whom I met on the street if he did not consider the raising of pota-



toes in such large quantities exhaustive to the soil, to which he replied, "O yes, certainly; but many of our farmers have such faith in the land that they believe it will continue in its present fertile state forever." Why don't you go to raising more stock and less potatoes? I asked. "Well," said he, "it is quite a while before we can get money out of our stock. For cattle we have to wait about four years before we can get the most money out of them, but we can to be sure sell sheep sooner than that."

Now the very point I wish to present is this: If the people of Aroostook county would raise less exhaustive crops and more butter, cheese and stock, it seems to me it would in time be much better for them. I was talking with a gentleman a short time ago who had been living in Washington some time, and I said to him, I suppose you have good butter and cheese there? "No," he replied. What is the matter? I asked. "Well," said he, "I do not know, unless it is because they can get poor butter cheaper than good." I had another friend, who went to California. He was much delighted with the country, and wrote home glowing letters about the people and their manners. In one of his letters he said they did not have to go through the laborious task of making butter as we do here in Maine. He said when they want butter they just take a good fat ox and boil him down, extracting the grease, making butter in that way. Well, he came back to Maine, and got one of our girls to go with him on his return trip as his wife. She was much delighted also with the country, and would write, I am not home-sick one bit, contented and all that sort of thing. One day I happened to peep into one of those home letters, and she says, "I am not homesick at all, O, no; but I would like some of the good milk and butter you have in Maine."

I must say I like good butter, and people who buy butter in large cities like it too, and it seems to me this is just the place to make it, and the more you make of that good butter the better. There is no limit to the market for good butter; there is no limit to the demand for good cheese. If the

people of Aroostook county will only make good butter and cheese they need not be afraid of overstocking the market.

I have often seen men in the city trying to sell their butter. Well, you ask them what they ask, and they will say fourteen cents, fifteen cents, etc. Another man will go into the same city and sell his butter without any effort at a good price, while the first man cannot sell his at all. And why is this? Simply because the man who cannot sell his butter has a poor article, while the man who sells his butter readily has a good quality of butter and people know what it is.

When a man says one breed of cows is just as good as another, he does not know. There is as much difference in cows as there is in horses. Then there is a great deal in the way you keep your cows. You cannot keep cows in a cold barn, on poor food and ice water, and have them do nicely. A man should be careful with his cows as much if not more so than he is with any other stock.

The gentleman who preceded me, said he made butter in fall, winter and spring; he did not make his butter all in June, and when he makes good, hard, yellow butter in winter he can sell it for a good price.

Mr. KEYES. I am somewhat interested in this butter question. Now, Mr. President, in order for this county to start into making butter, the first thing they must have is good cows; and having good cows, you want them well taken care of. As has been said, you do not want to keep them out doors. We want them kept so that they will give good milk, and we want it clean. We also want to handle them very gently; one cross word frequently spoils a good cow. It makes little difference how much you feed. Some men say, "don't give your cows too much to eat. Over-feeding spoils them." I say it does not. The harder you drive your cows the more profit you will get out of them. The more you pour into a cow the more she will pour into your pail. Then after we get the milk, we want a place to keep that milk. It is no use to set your milk in the sun when the thermometer is 100°. It is useless for you to undertake to make good

butter in that way. We want our milk room so arranged that we can control the temperature. A gentleman who used to live in Portland—was a merchant there—went into Leeds and bought a dairy farm, and went to making butter. He asked the people where he sold it to try it, and the word came back in a short time for more, and what he would supply them for. This summer he has sold his butter for 35 cents per pound. Now, ladies and gentlemen, don't go away with the idea you don't want any place to put your milk. It is as essential for you to control the temperature as it is for you to get the milk from the cows, and I would say to the ladies, if I had the milk to take care of, I would make my husband buy a Cooley Creamery, and then they would have the most of the work to do themselves.

Mr. ROBBINS. I know from what I have seen that you have the foundation for what can be made one of the finest dairy regions in the country. I live in a town where some of the leading men live and have lived; those who have made dairying a business for more than a quarter of a century. Many of them have selected the Jersey cow as superior for the manufacture of butter and cheese. You know the value of well selected stock, and you know what stock you prefer.



## AGRICULTURAL EXPERIMENTS AT MAINE STATE COLLEGE.

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BY PROF. J. R. FARRINGTON, STATE COLLEGE, ORONO.

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In the short time assigned me this afternoon, I wish briefly to present to your notice some of the experiments in practical agriculture that are in process of trial at the State College at Orono. Most of the gentlemen present are, I presume, practical farmers. You find, in your experience from year to year, questions presenting themselves for solution to which you can give no satisfactory answer. Yet the success or failure of your labors may depend upon the answers which in practice these questions receive from you.

I doubt if there is any calling in life where the problems to be solved are more numerous, complex and difficult, than are those forced upon us in practical agriculture. The soils we cultivate show marked differences in their available fertility. Peculiarities of climate and of season exert important influences upon our crops greatly affecting their yield; the time of planting and the methods of cultivation tending to still more complicate our labors and throw around the farmer's calling an air of mystery. Discouraged by difficulties that beset him, the timid farmer forsakes his fields and seeks an easier life; an unthinking man, with a perseverance commendable in itself, but unwisely directed, plods stolidly on in the way of his fathers, sure that what was good enough for them will answer all his demands; while the thoughtful, intelligent farmer, asks of his neighbors their practice, reads the recorded experience of practical men, studies the teaching of sciences relating to his calling, and seeks by actual experiments to learn from Nature herself the teaching that she, better than any other, is able to impart. Just here comes

in a difficulty. Nature's teachings assume many forms of expression, and the conditions which affect the character of her responses, change frequently, so that it is only by repeated questioning and careful attention to the sign language in which her replies are given that we can be certain of the answers she makes.

The varying conditions to which all our farm operations are exposed, render it necessary that agricultural experiments shall be carefully observed, and that they shall be repeated for a series of years. The data obtained from a single experiment are but imperfect at best, and it frequently occurs that so-called facts apparently demonstrated by a single trial, are, by repeated tests, proven to be no facts at all.

The farmer, busy and hard-worked, cannot devote to careful experimenting, the amount of time, labor and expense that are necessarily involved. His attempts in this line are seldom continued up to the point where they will afford positive and trustworthy instruction, and furnish reliable rules to guide him in practice. We are aware that, in the difficulties which beset them, the attention of many farmers is turned to the State College in the confident expectation that relief will come from that quarter. It is our desire to meet that expectation; and if sufficient means were at command, and sufficient time were allowed, much might be done. With such means and time as are available to us, we are at work on several problems in practical agriculture from the solution of which we hope to obtain results that will be of value to the farmers of the State.

The first experiment of which I will speak to you is one in the cultivation of fine varieties of sugar beets. In this experiment, we ask three questions:

- 1st. Is the relative size of beet seeds indicative of their vitality and germinating powers?
- 2d. Under similar cultivation, which variety is the most productive?
- 3d. Which variety contains the highest per cent. of sugar?

The ground selected for the experiment is a portion of the farm garden, a rich, sandy loam, to which no manure was applied this year.

Each variety was sown on a plat ten feet square, in rows eight inches apart, with the plants fourteen inches distant from each other. Each plat was divided in the center, and one-half of it sown with small seeds selected from an average lot; the other half with large seeds selected from the same lot. The weight of the one hundred and forty-four seeds required for each plat was obtained and recorded for future reference.

It is yet too early in the season to give results from the experiment. Only one point has been ascertained, it is this: In every plat the number of vacant places is greater by more than one-third where small seeds were sown, indicating greater vitality in the larger seeds,—a fact well worth regarding in buying beet seed. When the beets are harvested, we shall determine the yield per acre of the several varieties, and an analysis will be made to learn the per cent. of sugar in each. From the completed experiment, we hope to get knowledge that will be helpful to those who may grow beets for the enterprise already undertaken in the State, which proposes to manufacture sugar from the beet, and establish a new industry that shall be profitable to both the farmer and the manufacturer.

We began, last year, a series of experiments in cutting grass for hay, to learn at what period of growth it will yield the best returns when quality and quantity are both taken into account. We expect also to learn from this experiment whether early or late cutting has the greater tendency to exhaust the soil and deteriorate the crop. One acre of land is devoted to the trial. This is divided into two equal parts marked I and II. Each of these is again divided into four plats marked a, b, c, d, making in all eight plats, each containing one-eighth of an acre. One year ago these were all mowed, dried and weighed at the same date, and the weight of the crop from each plat recorded. This gave the natural



yield of each plat as a starting point from which to reckon. This year, plats d, d, in divisions I and II, were moved June 19, just as the timothy was beginning to head out, and the clover was showing its earliest blossoms. The yield of hay from these plats was 933 lbs. The per cent. of loss in drying was 61. Plats c, c, in divisions I and II, were cut July 2d, when the heads of timothy were fully formed and a few were in blossom. The clover was in full bloom. The yield of hay from these plats was 1002 lbs. The per cent. of loss in drying, 65. Plats b, b, in divisions I and II, were cut July 19, when the seeds of timothy were beginning to harden and the clover heads were brown and apparently ripe. The hay weighed 1215 lbs. The per cent. of loss in drying was 49. Plats a, a, in divisions I and II, mowed August 3, when the seeds of timothy were beginning to shell out, and the clover was over-ripe with many leaves fallen off, yielded 928 lbs. of hay. Per cent. of loss in drying, 46.

We purpose in the future to cut the grass on the several plats in this field at the same period of growth they were cut this year, until the land fails to produce a remunerating crop. A sample of hay from each cutting is preserved for analytical purposes. We already know the quantity of hay from each plat; something may be determined of the quality of the hay from the different cuttings by observation. Complete knowledge can only be gained by chemical analysis. A reliable analysis costs both time and money. All that the State College has of either of these, is necessarily used in the regular educational work of the institution. When the farmers, for whose benefit the results of these experiments will accrue, shall, through any means they may choose, furnish the money necessary for completing the work, then and not till then can full results be obtained and published.

The following is another experiment to which I will call your attention and the last I shall present :

Experiment for studying the capacity of corn to get its food from the soil, and the effects of different fertilizers upon it, with especial reference to the nitrogen supply. Potash and

phosphoric acid (with sulphuric acid and lime) supplied in proportions contained in a crop of 48-50 bushels, nitrogen in one-third, two-thirds, and full amount contained in same crop.

	Plat, No.	FERTILIZERS, Per Acre.	Nitrogen, Per Acre.
Group A. Valuable ingredients separately.	1.	Nitrate of Soda, 150 lbs. ....	24 lbs.
	2.	Sulphate of Ammonia, 112 lbs. ....	24 lbs.
	3.	Dried Blood, 225 lbs. ....	24 lbs.
	0.	No Manure. ....	24 lbs.
	4.	Superphos. 300 lbs., (Phos. Acid, 48 lbs.)	
	5.	Muriate of Potash, 150 lbs. (Potash, 75 lbs.)	
Group B. Valuable ingredients two by two.	6.	{ Nitrate of Soda, 150 lbs. .... { Superphosphate, 300 lbs.	24 lbs.
	7.	{ Nitrate of Soda, 150 lbs. .... { Muriate of Potash, 150 lbs.	24 lbs.
	8.	{ Superphos., 300 lbs. } Mixed Mineral { Muriate Potash 150 lbs. } Fertilizers.	
	00.	No manure.	
Group C. Complete Fertilizers. Nitrogen in different proportions and combinations.	9.	{ Mixed Mineral Fertilizers, (as No. 8.) { Nitrate of Soda, 150 lbs. ....	24 lbs.
	10.	{ Mixed Mineral Fertilizers, { Nitrate of Soda, 300 lbs. ....	48 lbs.
	11.	{ Mixed Mineral Fertilizers, { Nitrate of Soda, 450 lbs. ....	72 lbs.
	12.	{ Mixed Mineral Fertilizers, { Nitrogen Mixture, 150 lbs. ....	24 lbs.
	13.	{ Mixed Mineral Fertilizers, { Nitrogen Mixture, 300 lbs. ....	48 lbs.
	14.	{ Mixed Mineral Fertilizers, { Nitrogen Mixture, 450 lbs. ....	72 lbs.
	00.	No Manure.	
Group D. Complete Fertilizers. Nitrogen in different combinations.	15.	{ Mixed Mineral Fertilizers, { Sulphate of Ammonia, 225 lbs. ....	48 lbs.
	16.	{ Mixed Mineral Fertilizers, { Dried Blood, 450 lbs. ....	48 lbs.
	17.	{ Peruvian Guano, "standard," 550 lbs. { Muriate of Potash, 150 lbs.	48 lbs.
	18.	{ Stable Manure, good quality, well { cured, 15,000 lbs. ....	72 lbs.

The field devoted to this experiment is divided into twenty plats, each containing one-tenth of an acre. Each plat is thirty-five rods and three feet long and seven and one-half feet wide. The plats are made so long and narrow to more certainly eliminate the inequalities of the soil.

A complete fertilizer furnishes to the crop all the mineral ingredients and the nitrogen required for its growth. Many soils lack only one or two of these. The farmer who supplies one or two more than are needed wastes his money. He who would feed his crop intelligently must learn from

tests made upon the soil itself what plant food it is unable to furnish. In this experiment, Groups A and B, Nos. 1-9, the question what does this soil need? is asked in different forms. From Nos. 1-3, we seek to learn the effect of nitrogen alone, but in different combinations. No. 4 will tell the effect of sulphuric acid alone. No. 5, the effect of potash alone. Nos. 6-8, the effect of the ingredients two by two.

Group C, tests the effects of complete fertilizers, that contain the mineral ingredients for a crop of corn of about fifty bushels to the acre, with nitrogen added in the proportions of one-third, two-thirds, and the whole amount required by the crop. Nos. 9-11 give nitrogen in the form of nitrate of soda. Nos. 12-14 give it in the form of nitrate of soda, sulphate of ammonia and animal matter mixed.

From Group D, we shall learn the effect of complete manures, in which the nitrogen is supplied in still other forms of combination—sulphate of ammonia, dried blood, Peruvian guano and stable manure.

Ranged along the platform you will see a sample hill of corn from each plat of the experiment, twenty in all. While nothing definite and positive is taught by these samples, it is interesting to notice them. Apparently nitrogen, the most expensive component of the complete fertilizer, gives the poorest return. *No manure* is no poorer. Nos. 4 and 5, which show the mineral ingredients singly, promise a better yield. Two of the ingredients together show better results. The three ingredients together show still larger growth, and stable manure overtops them all. Farmers in this county will hardly be so deeply interested in this experiment as will those in the older counties, where the native fertility was long ago exhausted from the soil, and the question, "How shall I manure my fields?" is one of vital importance. Your anxiety lies in the direction of "How shall I dispose of the bountiful crops from my fertile fields?" But even the lands of Aroostook will wear out, and the knowledge we are striving to gain by asking questions of the soil will some time be needed here.



## THE BEET SUGAR INDUSTRY IN MAINE.

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BY ERNEST TH. GENNERT, SUP'T MAINE BEET SUGAR COMPANY,  
PORTLAND.

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Months have passed by since I had the pleasure of addressing you on the question of planting sugar beets, and pointing out to you the probable result the trial might have, and the sure result which would follow success. The leading and most enterprising farmers of Aroostook county have shown by their readiness to try the experiment, as it is termed, that they are well aware something has to be done if they will not follow in the wake of nearly every other farming community in the State of Maine, in fact, in every New England State, and every State in the Union, exhaust their land and make it comparatively speaking, non-productive. Even in Aroostook county we find plenty of land which was cleared not more than twenty years ago, and which to-day does not pay to farm because it has been cropped too much, it is worn out, and farmers investing their hard work on such land find but very poor compensation in the scanty harvests they can take off.

But in speaking of the production of sugar beets, we have to take in a wider scope; we have to examine the question of raising root crops; and their relation to general farming, and in pointing out to you the influence which the cultivation of sugar beets will exert on Aroostook county if successfully introduced, a few words of farming in general are necessary. The idea which has done so much mischief to our farmers who have been the pioneers, has been, that newly subdued land which they called virgin soil, was inexhaustible, and could be cropped for an indefinite time, yielding always bountiful crops, requiring nothing of the farmer but stirring the soil, sowing and harvesting. This idea has been exploded

long ago, yet but few farmers have taken the necessary steps to return to the land sufficient of what they carry from it, in order to be reasonably sure of good paying crops in general.

Accepting the fact which every farmer has to admit as true, and which is the foundation of all successful and remunerative farming, that without manuring there can be no paying farming, the question of successful farming has been reduced to the production of plenty and cheap manure. With plenty of good manure, judiciously applied year after year, it does not require an extra smart man to raise well paying crops; on over-cropped, worn out land, with manure applied in homœopathic doses, or none at all, the most intelligent and industrious farmer will find it up-hill work; he will find, notwithstanding the greatest exertion, he grows poorer every year. But without raising and feeding roots to your cattle, it is useless to expect large quantities of good and cheap manure. Anything which will lead the farmer in the right direction to root-raising, will bestow a lasting benefit on him and his farm, and this the cultivation of sugar beets most undoubtedly has done. Whatever the financial result of the first year's cultivation of sugar beets has been to the farmer, it has shown to him the right direction to successful farming, in making roots one of the general farm crops.

The farmer in nearly every State of the Union, has labored under the disadvantage of starting in the wrong direction, and once entered into the wrong system it has been kept up, and we have tried to make up in acreage what we lacked in yield from a given extent of ground; this applies as well to Aroostook county as to any other locality. But this starting in the wrong direction has not been without a natural cause. The pioneer who enters the wilderness to clear and subdue wild land, with very rare exceptions does so with very slender means; he has to provide shelter for himself and family, and also provide food. He cannot, therefore, be expected to start with the inauguration of a system of permanent improvement which calls for the outlay of large sums of money, and the waiting of years for returns from the same. What wonder,

than to find on most farms in Aroostook county, barns or cattle sheds in which roots would freeze as hard as a rock in less than an hour after they were put in, in winter? What wonder to find these barns entirely too small to contain sufficient cattle for the proportion of acres under tillage? What wonder to find the manure piles not only of the poorest quality, but also of the smallest dimensions? and what wonder, finally, to find plenty of land in Aroostook county which will hardly produce a crop of buckwheat, or a crop of potatoes, which is worth gathering? It is all very well to say build warm barns, keep plenty of cattle, raise roots to feed to your cattle with other feed which is generally wasted on the farm, in order to produce plenty and cheap manure to enrich your land with, to bring it to a high state of fertility.

All this is very easily said, but not so easily inaugurated; and here it is where the production of sugar beets for the manufacture of sugar comes in to help the start in the right direction, by first of all giving the farmer a cash crop on which he can rely as an income as soon as he takes it from the field to the factory, and secondly, by introducing on our farms a crop which leads to better and deeper cultivation; while being a feed crop, will furnish to the cattle the kind of feed so much needed on our farms in order to utilize much which goes to waste now. Of all the straw grown in the State of Maine, not 10 per cent. is utilized, while combined with the beet pomace it would fatten many thousands of cattle, doubling and trebling the manure at present produced on our farms. But the farmers in Aroostook county have found out by this time that the cultivation of sugar beets means high farming, means rational farming, it means the reverse from surface farming, which we have so long pursued. Root farming means subsoil farming, bringing into play a strata which has so far never been exposed to either sunlight, warmth or air; which, though it has received for years the leachings of the upper strata of soil, yet has so far contributed very little, if any, towards the growth of crops which were grown on the surface. The result of some of our farmers has shown most



conclusively that both the soil and climate of Maine is most excellently adapted for the cultivation of root crops, especially for the sugar beet.

But we have to pass from the considerations of general principles regarding root and beet raising, to the special features which we observed during the summer in the vicinity of Presque Isle, where the cultivation of sugar beets has received the most attention in the State of Maine. Every farmer has been aware the enterprise was from some unavoidable cause started too late in the season, which left no choice in the land as to its adaptability for producing a root crop or even a crop of anything, the farmer generally takes his best land for the crop on which he counts most, using his manure there, and attending to this crop first and foremost; the cultivation of beets coming rather late in the season to the notice of the farmer, had to be done on land left for no special purpose, though as a general rule the farmers have done the best they could under such circumstances. The late opening of spring was soon followed by several weeks of severe drought and intense heat, which put the whole beet culture to a severe test. Taking a general view of the state of affairs as they developed from day to day, it could be easily observed that on land in a good state of fertility, or land which had been manured the previous fall, the young beet plants showed their usual vigor, whole acres having hardly a wilted leaf during the hottest of mid-day sun, while on land which had no fertility or cultivation, the beet plants, after sprouting well, perished for want of available nourishment. The same was the case with land which had been manured in the spring with coarse unrotted barnyard manure. Some fields had started so well that the rows were full up and had been once hoed, yet when the tender plant with its tiny rootlets could find no nourishment, it had to perish, and whole acres disappeared within a few days. That this was due to no other cause was, in some cases, most clearly demonstrated.

A three acre field had been manured and ploughed well last fall, with the exception of about one-half acre, which,

tongue-like, run into the square field. This half acre had no manure in the fall because the stock was completely exhausted. In the spring some fresh manure had accumulated and was placed on the half acre, in the same proportion as on all the rest, and the beets planted. The whole field came up well, but in about one week every plant from the tongue-like piece had disappeared, leaving the land completely bare, while on the other two and a half acres almost surrounding it, the crop looked well, and when harvested, gave a good yield. A second field came under my observation bringing the same features out very prominently. Two acres of poor land were well prepared and planted and came up well, but in less than a week every plant disappeared, because it had perished; thinking something might be the matter with the seed, the field was worked over with a cultivator and freshly planted, when to the great delight of the young men, in eight days the beet rows were all up again. They informed their parent of the fact, expressing their confidence that they would yet reap the reward of a good crop for their labor, but alas for worn-out soil, in a few days they had all perished again.

In judging from these fields, the conclusion forces itself upon the close observer, that every field which was in a good condition and would have given fair returns of any other crop, gave a good yield of sugar beets, while over-cropped and ill-prepared land, even if manured in spring, did yield but little if any crop; between land in a good state of fertility and land even too poor to produce a crop of buckwheat, there were fields in every stage of fertility and poverty, most or at least many were abandoned, some ploughed up others not. To the surprise of many farmers a struggle ensued between the crop and the weeds and in many cases the former predominated.

The more favorable summer season which followed the bad spring, brought out many a neglected and backward field, and many farmers who had given up only too readily, came to the conclusion from observation on their own fields, that a good crop of sugar beets can be raised with proper care on



any land which will produce any other good field crop. A great many farmers who thought that early planting would be injurious to sugar beets, have been convinced of their mistake, and in planting the crop another year, it should be the great aim of every farmer to have the sugar beets planted early enough that the leaves cover the ground by the fourth of July, that no more work has to be done on them, which will ensure a good and early crop and give the farmer ample time to attend to his hay crop.

When farmers entered into the enterprize this year, they did so with a great deal of good will but with no experience, and no very great result could be expected; the general opinion expressed by farmers is to benefit by their experience for another year. Though the result has fallen short of the expectation, the fact that good beet crops have been raised after fields had been given up and partly ploughed up, shows that with proper care, and under ordinary favorable circumstances, Aroostook county will prove one of the finest beet growing districts in the world. As everything was a trial, and new, hardly any machinery has been used; while it is but reasonable to expect as the cultivation of sugar beets is carried on on a larger scale, machinery will be almost exclusively used. Most parties appear to agree now that early planting is essential to success, and that the European principle considering the danger from too early planting, by far less than from too late planting, is the correct one there as well as here.

The following account is from Geo. A. Parsons of Presque Isle :

	Dr.
Three acres of sugar beets.	
Plowing twice.. . . . .	\$9.00
Harrowing and smoothing.....	2.25
Marking.....	60
Planting, 1½ days . . . . .	1.50
Thinning, 12 days.....	9.00
Weeding by hand.....	4.50
Horse hoeing.....	4.00



Harvesting and delivering to dry-house.....	\$30.00
Thirty-six pounds of seed .....	7.20
Thirty-six loads of manure, half of said value...	36.00
Quarter value of last year's manure.....	8.00
Interest and taxes.....	15.00
	<hr/>
	\$127.05

Cr.

By tops fed to milch cows.....	\$15.00
43 2-5 tons of beets sold, cost \$2.58.....	112.05
	<hr/>
	\$127.05

If, then, the actual self cost after every part of the work performed has been well paid is \$2.58, the result has been satisfactory.

Mr. Alex. Johnston, in Wiscasset, has raised sugar beets for seven or eight years in succession; the crop has never failed, and this year, though not as good as generally, he harvested by actual weight 24 tons, 700 lbs. per acre, while his neighbor, who had the field of beets almost adjoining his, whose soil is fully as good as his, but who appears to labor under the impression because a kind Providence provides rain and sunshine, perhaps Providence will also attend to the weeding and cultivating; he harvested not quite 11 tons by actual weight and measurement per acre.

Mr. Libby, President of First National Bank, Portland, harvested from his farm  $17\frac{3}{4}$  tons per acre. Mr. Wentworth, Superintendent of the Reform School, Cape Elizabeth, had a still better yield, though he thought in the earlier part of the season, which was very unfavorable, he would have no beets at all. I might continue the list of parties who have done well in beet raising, but this is enough to show that beets, when properly taken care of, on land well prepared, will yield as large a crop in the State of Maine as anywhere in the world. But while grass or hay farming is in reality the lowest stage of farming, requiring the least brain, the least care and attention, the least work, and gives the least returns, barely keep-

ing the farmer from starvation, root crop farming, especially sugar beets, means high farming, requires the most brain, a good deal of care and attention, and a good deal of work; it will give, if all these are properly applied, the largest cash returns, and will bring the farm into the highest state of productiveness for every crop the farmer may afterwards wish to raise.

We have proved by our experiment this year, that large crops of beets can be raised in every part of the State of Maine, because what many can do, all can do, if they will only profit by the experience of their neighbors; we have proved that the beets produced in any part of the State of Maine yield as much sugar as the beets raised in any part of the world; and we have proved that the sugar from beets raised in Maine can be as easily extracted, and is of as good quality as the best in any country.

Without root crops no production of manure, to any great extent, is possible. Sugar beets will bring cash and plenty of feed, consequently plenty of manure, without which farmers will always have hard work, while plenty of manure will restore lost fertility to our worn out lands, and eventually make farming easy, and above all, remunerative.





# LAWS OF MAINE,

RELATING TO AGRICULTURE, AND OF DIRECT INTEREST  
TO FARMERS.

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## BOARD OF AGRICULTURE.

Revised Statutes of 1871, Chapter 58.

Sec. 1. The board of agriculture consists of five members at large appointed by the governor with advice of council, of whom two at least shall be from the faculty of the state college of agriculture and the mechanic arts, and of a member elected by the state agricultural society and one from each county to be elected by ballot by any county agricultural or horticultural society at its annual or other meeting called for the purpose; and they hold their offices three years from the third Wednesday of January next after.

Sec. 2. If there is more than one such society in any county, the executive officers of the oldest shall designate a time and place for a convention of five delegates, chosen at a regular meeting from each society; and the secretary of such oldest society shall give written notice thereof to the secretary of each other society. The convention shall be held prior to the second Wednesday of December, elect a president and secretary, and by ballot, a member of the board of agriculture for that county. If no election is thus made, the secretary shall immediately send to the governor and council the names of two or more persons having the highest number of votes; and they shall elect one of them. The written certificate of the secretary of the society or convention electing a member, shall be his credentials in the board.

Sec. 3. The board of agriculture shall hold two sessions annually, not exceeding four day each, one of which shall be held within such convenient distance of the state college of agriculture and the mechanic arts as will enable the students and faculty thereof to attend and have the advantage of the addresses and discussions before the board; and the other session shall be at such time and place as is, from time to time, determined by vote of the board. The members of the board shall have no compensation for their time or services; but their necessary expenses of travel and attendance at the sessions, shall be paid, an exact account of which shall first be rendered by each member, examined by a committee and their report thereon accepted by the board.

Sec. 4. The board may elect a suitable person secretary thereof, and prescribe his duties, and in case of vacancy by death or otherwise, the governor with advice of council, may fill it; all reports and returns required by law to be made by county societies, shall be made to the secretary of the board; his compensation shall be a thousand dollars a year, and his necessary traveling and incidental expenses in the discharge of his duties. He shall also be a member ex-officio of the board of trustees of the state college of agriculture and the mechanic arts.

Sec. 5. The board shall investigate all such subjects relating to agriculture, horticulture and the arts connected therewith, as they may think proper, and may take and hold in trust, donations or bequests made to it for promoting agricultural education or the general interest of husbandry; and annually, on or before the third Wednesday of January, by its secretary, it shall submit to the legislature a detailed report of its doings, with such statistics as he may collect, and such recommendations and suggestions as the interests of agriculture seem to require, and also an abstract or digest of the returns of the several agricultural and horticultural societies, and cause to be printed under his directions, not more than fifteen thousand copies of said report, and five thousand of said abstract, five thousand of the former and one of the

latter for the use of the legislature ; and the remainder for distribution, under the direction of the board, among the people of the state.

Sec. 6. The governor and council, from time to time, shall draw their warrant on the treasurer for such sums of money as are necessary to defray the salaries and expenses herein provided for, an account of which shall be first rendered by the secretary of the board and audited by them, and a sum not exceeding one thousand seven hundred dollars, annually, is hereby appropriated to meet such expenses.

#### STATE AGRICULTURAL SOCIETY.

Revised Statutes of 1871, Chapter 58.

Sec. 7. The Maine state agricultural society, at its annual meeting, shall elect, by ballot, a president, secretary, treasurer, trustees and other necessary officers.

Sec. 8. Said society may take and hold property, real and personal, the annual income of which shall not exceed five thousand dollars, to be applied exclusively to the advancement of agriculture, horticulture, and the arts connected therewith ; and the treasurer of said society shall give suitable bonds to the board of trustees, for the safe keeping of said property, and for the faithful discharge of his duties. At each annual meeting, the treasurer shall submit a full and correct account of the money received and paid out, from whom received and to whom and for what purposes paid ; and the secretary shall make a report of the doings of the society, with such information and suggestions as he deems useful to the public.

#### COUNTY AND LOCAL AGRICULTURAL SOCIETIES.

Revised Statutes of 1871, Chapter 58.

Sec. 9. County and local agricultural societies may take and hold property, real and personal, the income of which shall not exceed three thousand dollars, to be applied to the purposes provided in their charters ; or their treasurers may



receive conveyances or leases of such property, for their societies, and hold, sell, mortgage or pledge it, and shall give bonds to the trustees for the safe keeping thereof and the faithful discharge of their duties.

Sec. 10. The treasurer of an incorporated agricultural or horticultural society, on application made prior to the first Wednesday of December in each year, shall be entitled to receive from the state treasury a sum equal to that raised by such society in the year next preceding; but not exceeding one cent to each inhabitant of the county where such society is located, according to the last preceding national census, nor more than four hundred dollars to one county. If there is more than one such society in any county, and the sums so applied for exceed the limit aforesaid, it shall be paid to each in proportion to the amount expended by it as herein after provided. But the Penobscot and Aroostook union agricultural society may annually receive as much as raised by it, not exceeding one hundred dollars, without regard to population; and the Waldo and Penobscot agricultural society as much as raised by it, not exceeding a hundred and thirty dollars; and the same shall be deducted from the sums allowed to the counties of Waldo and Penobscot in proportion to the number of inhabitants of each county within the limits of said society.

Sec. 11. But none of such payments shall be made to any society until the treasurer thereof files with the state treasurer a certificate, on oath, stating the amount raised by it and containing the specifications required in section twelve, and also a certificate from the secretary of the board of agriculture that said society has complied with the requirements of section thirteen.

Sec. 12. Every society receiving the bounty of the state, shall expend an equal amount each year in premiums and gratuities for the improvement and encouragement of agriculture, horticulture, or mechanic arts, unless the board of agriculture directs for what purposes a sum not exceeding

half of such bounty shall be expended; and then it shall be expended accordingly.

Sec. 13. Every society applying for the bounty of the state shall require of all competitors for premiums either on animals, crops, dairy products, improvement of soils or manures, a full and accurate statement of the process or method of rearing, managing, producing, and accomplishing the same, together with its cost and value, with a view of showing the profits or benefits derived or expected therefrom; and the application for bounty shall embrace all the specifications included in the following form, to wit: I, A. B., treasurer of — society, do hereby apply for bounty in aid of said society, as granted by the laws of the state, and being duly sworn, (or affirmed) do say that the sum of — has been raised and paid in good faith into the treasury of said society, and that the sum of — has been awarded in premiums or otherwise expended within the year past in conformity with the provisions of the laws of the state relative thereto.

Sec. 14. The secretaries of the several societies shall prepare an annual report, embracing a concise statement of the financial condition and doings of the society, with a synopsis of the premiums awarded, to be made by filling blanks furnished by the secretary of the board of agriculture for the purpose. Said report shall also state the leading features of the annual exhibition, the character of the efforts of the society for the advancement of agriculture, the principal crops grown in the county or district, the success attending their culture as compared with former years, and the obstacles met with; and generally on the condition, prospects and wants of agriculture, so far as they are able to ascertain them; which report, with a list of the officers of the society and the post office address of each, to be renewed whenever a new election occurs, and all statements made by successful competitors for premiums, and any reports of committees, essays, addresses or other papers presented to the society containing matters of general interest, shall be returned to the secretary of the



board of agriculture on or before the first Wednesday of December, in each year. Upon receipt and after examination of said returns, if the secretary of the board of agriculture finds them full, faithful and accurate, according to the intent hereof, he shall, and not otherwise, issue the certificate mentioned in section eleven.

Sec. 15. All incorporated agricultural societies may, by their officers, define and fix bounds of sufficient extent for the erection of their cattle pens and yards, and for convenient passage ways to and about the same, on the days of their cattle shows and exhibitions, and for their plowing matches and trial of working teams, within which no person shall be permitted to enter or pass, unless in conformity with the regulations of the officers thereof; but they shall not so occupy or include the lands of any person without his consent, or obstruct the public travel of any highway.

Sec. 16. If any person, contrary to such regulations and after notice thereof, enters or passes within the bounds so fixed, he shall forfeit a sum not exceeding five dollars, to be recovered, on complaint, for the use and benefit of such society.

Sec. 17. The officers of any such society may appoint a sufficient number of suitable persons, inhabitants of the county, to act as constables at cattle shows and exhibitions; and they shall have and exercise all the powers of constables, in relation to the preservation of the public peace, and enforcing the rules and regulations of said society, within the towns where such shows and exhibitions are held, from twelve o'clock at noon of the day preceding the commencement of such shows and exhibitions, and until twelve o'clock at noon of the day succeeding the termination thereof, and no longer.

#### DIVISION FENCES.

Revised Statutes of 1871, Chapter 22.

Sec. 1. All fences, four feet high and in good repair, consisting of rails, timber, boards or stone walls; and brooks,



rivers, ponds, creeks, ditches, and hedges, or other things, which in judgment of the fence viewers having jurisdiction thereof, are equivalent thereto, shall be accounted legal and sufficient fences.

Sec. 2. The occupants of lands inclosed with fences shall maintain partition fences between their own and the adjoining inclosures, in equal shares, while both parties continue to improve them.

Sec. 3. If any party neglects or refuses to repair or rebuild any such fence, which he ought to maintain, the aggrieved party may complain to two or more fence viewers of the town where the land is situated, who, after due notice to such party, shall proceed to survey it, and if they determine that it is insufficient, they shall signify it in writing to the delinquent occupant, and direct him to repair or rebuild it within such time as they shall judge reasonable, not exceeding thirty days. If the fence is not repaired or rebuilt accordingly, the complainant may make or repair it.

Sec. 4. When the complainant has completed such fence, and after notice given it has been adjudged sufficient by two or more of the fence viewers, and the value thereof, with the fence viewers' fees, certified under their hands, he may demand of the occupant or owner of the land, where the fence was deficient, double the value and fees thus ascertained; and in case of neglect or refusal to pay the same for one month after demand, he may recover the same by an action on the case, with interest at the rate of one per cent. a month, and if the delinquent owner or occupant repairs or rebuilds such fence without paying the fees of the fence viewers, certified by them, double the amount thereof may be recovered by the complainant as herein provided.

Sec. 5. When the occupants or owners of adjacent lands disagree respecting their rights in partition fences and their obligation to maintain them, on application of either party, two or more fence viewers of the town, where the lands lie, after reasonable notice to each party, may in writing under their hands assign to each his share thereof, and limit the

time in which each shall build or repair his part of the fence, not exceeding thirty days. Such assignment and all other assignments of proprietors of partition fences herein provided for, recorded in the town clerk's office, shall be binding upon the parties, and they shall thereafter maintain their part of said fence. If such fence has been built and maintained by the parties in unequal proportions, and the fence viewers adjudge it to be good and sufficient, they may, after notice as aforesaid, in writing under their hands, award to the party who built and maintained the larger portion, the value of such excess, to be recovered in an action on the case against the other party, if not paid within six months after demand. Parties to assignments under the provisions hereof shall pay the fees of the fence viewers certified under their hands, in equal proportions, and if either party neglects to pay his proportion within one month after demand, the party applying to the fence viewers may pay the same and recover in an action on the case, of said delinquent party, double the amount of his said proportion of said fees.

Sec. 6. If any party refuses or neglects to build and maintain the part thus assigned him, it may be done by the aggrieved party; and he shall be entitled to the double value and expenses ascertained, and to be recovered as provided in section four.

Sec. 7. All division fences shall be kept in good repair throughout the year, unless the occupiers of adjacent lands otherwise agree.

Sec. 8. When from natural impediments, in the opinion of the fence viewers having jurisdiction of the case, it is impracticable or unreasonably expensive to build a fence on the true line between the adjacent lands, and the occupants disagree respecting its position, on application of either party as provided in section five, and after notice to both parties, and a view of the premises, they may determine, by a certificate under their hands communicated to each party, on which side of the true line, and at what distance, or whether partly on one side and partly on the other, and at what distances, the



fence shall be built and maintained, and in what proportions by each party; and either party may have the same remedy against the other, as if the fence was on the true line.

Sec. 9. When adjacent lands have been occupied in common without a partition fence, and either party desires to occupy his in severalty, or when it is necessary to make a fence running into the water, and the parties liable to build and maintain it disagree, either party may have the line divided on application to the fence viewers of the town; who shall proceed as is provided in section five; except that the fence viewers may allow a longer time than thirty days for building the fence, if they think proper, having regard to the season of the year. In other respects the remedy for the aggrieved party shall be the same as there provided.

Sec. 10. When one party ceases to improve his land, or lays open his inclosure, he shall not take away any part of his partition fence adjoining the next inclosure improved, if the owner or occupant thereof will pay therefor what two or more fence viewers, on due notice to both parties, determine to be its reasonable value.

Sec. 11. When any land, which has been uninclosed, is afterwards inclosed, or used for pasturing, its occupant or owner shall pay for one-half of each partition fence on the line between his land and the inclosure of any other occupant or owner, and its value shall be ascertained in writing; if the parties do not agree, by two or more of the fence viewers of the town where such fence stands; and after the value is so ascertained, on notice to such occupant or owner, if he neglects or refuses for thirty days, after demand, to pay it, the proprietor of the fence may have an action on the case for such value and the costs of ascertaining it.

Sec. 12. If the line on which a partition fence is to be made or to be divided, is the boundary between two or more towns, or partly in one town, and partly in another, a fence viewer shall be taken from each town.

Sec. 13. When a fence between the owners of improved lands is divided either by fence viewers, or by the written



agreement of the parties recorded in the town clerk's office, where the land lies, the owners shall erect, and support it accordingly; but if any person lays his lands common, and determines not to improve any part of them adjoining such fence, and gives six months' notice to all occupants of adjoining lands, he shall not be required to maintain such fence while his lands so lie common and unimproved.

Sec. 14. Nothing herein extends to house lots, the contents of which does not exceed half an acre; but if the owner of such lot improves it, the owner of the adjacent land shall make and maintain one-half of the fence between them, whether he improves or not; nor shall the provisions of this chapter make void any written agreement respecting public fences.

#### FENCES ON COMMON FIELDS.

Revised Statutes of 1871, Chapter 22.

Sec. 15. When several lots or pieces of land are inclosed and fenced in one common field, or when all the proprietors of such lands agree to inclose them in that manner, said proprietors may hold regular meetings when they judge proper, make such rules for managing their common concerns, and adopt such equitable modes of improvement as their common interest requires; but in all other respects each proprietor may, at his own expense, inclose, manage and improve his own land as he thinks best, maintaining his proportion of fence inclosing the general field.

Sec. 16. Upon the application of any two or more proprietors to any justice of the peace for the county, where such land lies, he shall issue his warrant to one of the applicants, or to the clerk of the proprietors, requiring him to call a meeting of the proprietors, and expressing in the warrant the time, place and purpose thereof.

Sec. 17. Notice of the meeting shall be served at least fourteen days previous to the time appointed, when all the proprietors reside in the town where the land lies, by reading the warrant to each proprietor, or giving him a copy in hand, or by leaving it at his usual place of abode, if the proprietors

have not been previously organized for the aforesaid purpose, or if no other mode of notice has been fixed by their standing rules; and in such case if one or more of the proprietors reside without the town or plantation, notice shall be given to them by publishing a copy of said warrant in some newspaper printed in the county, or in the State paper, three weeks successively, the last publication to be at least fourteen days before the time appointed. When the standing rules of the proprietors determine the mode of serving notices for their meetings, it may be observed in service of said warrant, at the election of the party serving it.

Sec. 18. At all meetings of the proprietors, each may vote according to the relative amount or value of his interest, if known; if not, they shall all vote equally, and absent proprietors may vote by written proxy.

Sec. 19. They may raise money from time to time for defraying their common charges and for managing their affairs, which shall be assessed upon the several proprietors, in proportion to their interests, by their assessors; and any person aggrieved by such assessment may apply to the county commissioners, who may abate his part of it in whole or in part, if they see cause.

Sec. 20. They may, at their annual or other meeting, duly notified, choose a clerk, three or five assessors, a collector, and such other officers as they shall find necessary, to continue in office until removed by them, or others are chosen and qualified in their stead. The clerk and assessors shall be sworn.

Sec. 21. Such clerk shall issue his warrant to the collector, requiring him to collect all money so assessed, and to pay it over to the clerk or other proper officer according to the orders of the proprietors; and the collector shall collect it as collectors of towns are authorized to collect town taxes.

Sec. 22. The whole fence inclosing such general field, as far as convenient, shall be apportioned amongst the proprietors according to the number of acres held and cultivated or otherwise used by each; and the part to be maintained by



each shall be set out and assigned to him by any two or more fence viewers of the town, unless they agree on an apportionment of the fence among themselves. The proportion of fence so assigned to each shall be recorded by the clerk in the books of the proprietors; and if there is no such clerk, by the clerk of the town on the town records.

Sec. 23. If any proprietor of land in such general field declines to cultivate his land, or to use it for pasturing, and gives written notice of his intention to the clerk of the proprietors, he shall not be required to maintain any part of the fence, nor to pay any tax or assessment on account of his land while he neglects to cultivate or use it as aforesaid.

Sec. 24. The expense of apportioning the fence, and of making and maintaining such part thereof as cannot conveniently and justly be assigned to any one proprietor, shall be borne by all the proprietors, to be taxed in proportion to their interests; and the part assigned to each shall be made and maintained by him while he uses his part of the general field for pasturing, planting, mowing, or otherwise.

Sec. 25. If any part of the fence assigned to a proprietor become deficient, and he does not repair it within three days after notice of such deficiency given to him or his tenant by a fence viewer of the town, it may be repaired by any other proprietor; and such repairs may be examined by any two or more fence viewers, and if adjudged by them, after notice, to be sufficient, they shall ascertain their cost, and make a statement thereof, and of the amount of their fees, in writing under their hands.

Sec. 26. The person making such repairs may demand of the deficient proprietor, or of his tenant, double the costs of such repairs and the fees thus ascertained; and if they are not paid within one month after notice and demand thereof, he may recover them in an action on the case.

Sec. 27. If part of the fence is suddenly blown down, or carried away by a flood or tempest, when the crops in the field are thereby exposed to immediate destruction or injury, the proprietor to whom it was assigned shall repair it within



twenty-four hours after notice thereof given him by a fence viewer. If he fails so to do, it may be repaired by any other proprietor; and he may recover double the costs thereof, and fees, as provided in the preceding section. The fence viewers may allow a longer time than twenty-four hours, if they think proper.

Sec. 28. The proprietors may choose one or more field drivers, who shall have and exercise the same powers with respect to the general fields, as are exercised by field drivers chosen by a town.

Sec. 29. If a proprietor puts into the general field any horses, cattle, or other beasts contrary to the regulations of the proprietors, either by putting in more than the number allotted him, or before the day fixed for that purpose, or by keeping them therein longer than the time limited, he shall be considered a trespasser; and his beasts may be impounded, as taken doing damage, as if he owned no land in the general field.

Sec. 30. If any proprietor is injured in his lands by the beasts of a stranger, he shall have the same remedy therefor as if his land had been inclosed and used separately. When damage happens to a proprietor through the insufficiency of the fence of a co-proprietor, he or the occupant of his land shall be liable to pay it.

Sec. 31. Every proprietor of land lying unfenced in a general field shall once in every two years, if requested by the owner of the adjoining land, run lines with him between their lots, and establish boundaries by sufficient mete stones, at their joint expense; and if he fails so to do, after at least six days' notice, he shall forfeit two dollars, to be recovered by such adjoining owner to his own use in an action on the case.

Sec. 32. A major part in interest in any common or general field, at any legal meeting called for the purpose, may discontinue their association; not to take effect until six months after the vote for that purpose, unless all the proprietors consent to an earlier period.

Sec. 33. Nothing contained in this chapter shall prevent the proprietors of any such common field fenced, who had been duly organized previous to February twenty-fourth, eighteen hundred and twenty-one, from making and maintaining their fences according to rules and orders before that date agreed on by them at any legal meeting.

Sec. 34. Portions of common fields inclosed under the provisions hereof, which are unoccupied and unimproved by their owners on account of their being rocky or barren, shall be excluded in all estimates for assessments under section nineteen, or for apportionments of fence under section twenty-two.

Sec. 35. Any three or more proprietors of lots within one general fence or inclosure, by a petition in writing to the proprietors of such field, at any meeting thereof, legally warned for that purpose, may request to have their lots, either alone, or jointly with any other lots in said field, divided from the remainder, to be inclosed in one common fence, and occupied by them as an entire field separately from the other proprietors of the general field; and if the majority of the proprietors in interest, present at such meeting, refuse their assent to such division, the county commissioners may, upon the like application, appoint three or five disinterested and suitable persons within the county where such general field is situated, to make such division thereof, if they deem it expedient; and to assign to each field its proportion of the partition fence, which shall become necessary by reason of such division, to be kept up and maintained by each proprietor of said general field, and such persons shall, as soon as may be after their appointment, make return of their doings under their hands to such commissioners; and after the acceptance thereof by them, the fields so divided shall be deemed separate general fields, and the proprietors of the field so set off and the remaining proprietors of the original shall be distinct and separate proprietary bodies, having all the like powers and privileges, and subject to all the duties and liabilities, as the proprietors of the original

general field before such division was made; but no order for such division shall be made, nor any committee appointed as aforesaid, until the other proprietors have had notice of the petition for such division; which shall be given by serving the clerk of the proprietors with a copy of the petition, thirty days at least before such order or appointment is made.

Sec. 36. When the major part in interest of the proprietors of any tract of land consisting of five or more allotments are desirous of inclosing them in one general field, they may apply to the supreme judicial court in the county where such land lies, and when such land lies in different counties, then to such court to be holden in either; and the court may order such notice to all parties interested, as they may deem reasonable, and after hearing the parties appearing, may order the land to be so enclosed.

Sec. 37. After a common or general field is so established by order of court, the further proceedings in relation thereto shall be the same as are provided when a field is so enclosed by the consent of all the proprietors; and the proprietors shall be entitled to all the privileges, and subject to all the duties, before provided with respect to the proprietors of fields inclosed by consent.

Sec. 38. Any fence viewer, who, when requested, unreasonably neglects to view any fence, or to perform any other duties herein required of him, shall forfeit three dollars to any person suing therefor, within forty days after such neglect. He shall also be liable for all damages to the party injured.

Sec. 39. Each fence viewer shall be paid by the person employing him at the rate of one dollar a day for the time he is so employed. If the party liable neglects to pay the same for thirty days after demand, each of such fence viewers may recover double the amount in an action on the case, and be mutually witnesses for or against each other.



## DRAINING SALT MARSHES.

Revised Statutes of 1871, Chapter 22.

Sec. 40. The owners or occupants of salt marsh in any town, enclosed by ditches for drainage and partition, shall maintain such ditches between their own and the adjoining enclosures while they continue to improve them, in proportion to the benefits accruing to each by such drainage, in the judgment of the fence viewers in such town, who shall have jurisdiction thereof the same as they have of fences; and all the duties, obligations and liabilities of adjoining owners or occupants of such marsh as to making, repairing, and maintaining such ditches, and the powers, duties, penalties and fees of fence viewers in relation thereto shall be the same as prescribed in the preceding sections in relation to partition fences.

Sec. 41. Said fence viewers shall determine the width and depth of the ditch, neither to exceed three feet, and the time to be allowed for making it, not exceeding sixty days; and notice thereof shall be given to the delinquent proprietor; and if he neglects to make or repair his portion of such ditch, it may be done by the complainant, to be adjudged sufficient by two or more fence viewers, who shall make a certificate thereof, and of its value and their fees. If such delinquent owner or proprietor neglects payment of said value and fees, one month after demand, the complainant may recover of him double the amount thereof with interest at the rate of one per cent. a month, in an action on the case.

Sec. 42. When a ditch between improved lands of different owners is divided by fence viewers, or by the written agreement of the parties, recorded in the town clerk's office, where the land lies, the owners shall make and maintain it accordingly; but if any person lays his lands common, and determines not to improve any part of them adjoining such ditch, and gives six months notice to all occupants of adjoining lands, he shall not be required to maintain such ditch while his lands so lie common and unimproved.

## POUNDS AND IMPOUNDING BEASTS.

Revised Statutes of 1871, Chapter 23.

Sec. 1. Each town shall constantly keep and maintain in such place as the inhabitants direct, one or more sufficient pounds for the reception of beasts liable by law to be impounded; and for six months neglect to do so, shall forfeit not less than fifty dollars, to be expended by an agent appointed by the court to build or maintain such pound or pounds.

Sec. 2. The owner of every horse, horse kind, ass, mule, swine or neat beast found at large without a keeper in the highways, town ways, or commons of the town, shall forfeit seventy-five cents for each, twenty-five cents for each goat, and ten cents for each sheep so found, recoverable in action of debt; or the beasts may be impounded till such forfeiture, with the charges of impounding and keeping them, and all fees, are paid by the owner or claimant.

Sec. 3. If such horse is an ungelded male of one year old or upwards, his owner shall forfeit a further sum of four dollars. If any ram or he-goat is found going at large out of the owner's inclosure, between the tenth day of August and the twentieth day of November, his owner shall forfeit a further sum of five dollars.

Sec. 4. Any person injured in his land by sheep, swine, horses, asses, mules, goats, or neat cattle, in a common or general field, or in a close by itself, may recover his damages by distraining any of the beasts doing it, and proceeding as hereinafter directed, or in an action of trespass against the person owning or having the possession of the beasts at the time of the damage, and there shall be a lien on said beasts, and they may be attached in such action and held to respond the judgment as in other cases, whether owned by the defendant or only in his possession. But if the beasts were lawfully on the adjoining lands, and escaped therefrom in consequence of the neglect of the person suffering the damage to maintain his part of the partition fence, their owner shall not be liable therefor.



Sec. 5. Each town shall annually choose a pound keeper for each pound therein, who shall be sworn, and before he acts give bond with sureties satisfactory to the municipal officers, for the faithful discharge of his duties; and the town shall be responsible for all his illegal doings or defaults, to the party injured, in an action on the case.

Sec. 6. Each pound keeper, in a book to be provided at the expense of the town, shall record at length all the certificates received from persons committing beasts to the pound, or finding stray beasts, and a single copy of all advertisements by him posted or published; and shall note therein when a beast was impounded, and when, and by whom taken away, and all his proceedings in the impounding and sale specified in section thirteen, the price for which said beast was sold, the name of the purchaser, and the disposal of the proceeds of sale; and a copy of said record duly attested by him or his successor shall be evidence for the purchaser of his title to said beast, and of the truth of all the facts thus recorded; and for making such record, and for each copy thereof, the pound keeper shall be entitled to twenty-five cents; and said book shall be delivered to his successor in office, and shall be open to inspection of all persons interested therein.

Sec. 7. The pound keeper shall restrain the beasts impounded in the town pound, or such other place, after the first day, as is more for their comfort, or their safety, and for giving them food and drink; which shall be furnished by him at the expense of the impounder. Unless payment is made in advance, or sufficient security therefor tendered, he need not receive such beasts into pound.

Sec. 8. Before the pound keeper shall receive any beast into pound, the impounder shall furnish him with a certificate under his hand, briefly describing the beast, the cause of impounding, the amount of damages or forfeiture claimed, and charges of impounding then accrued, of the following purport: "To the pound keeper of —

"The undersigned A. B. of B, herewith commits to pound



(a horse or cow, as the case may be, with a short description of the beast), taken up (in the highway or inclosure of said A. B. of B. as the case may be), and the said A. B. demands — dollars and — cents, for (damages or forfeiture as the case may be), and the unpaid charges for impounding the same.

“Witness my hand, A. B. of B. (date) 18—.”

Sec. 9. The pound keeper shall not be liable to any action for receiving or detaining any beast so committed, till the sums claimed by such certificate, and all other due expenses, costs and fees are paid to him, except as provided in the next section.

Sec. 10. If the claimant of such beast objects to the amount stated as damages, or if no claimant appears, the pound keeper shall, within ten days and not afterwards, issue a warrant under his hand to two disinterested persons of said county to the following purport :

“P., ss: To E. F. and G. H., two disinterested persons of said county : Greeting :

“You are hereby appointed to view and estimate, upon oath, according to your best judgment, the damages done to A. B. by the (horse or oxen as the case may be), owned or claimed by (C. D. or by owner unknown), and make due return to me within twenty-four hours, with your doings therein ; first giving the said A. B. reasonable notice of the time when you will view the place where the damages were done.

“Given under my hand this — day of —, 18—.

“O. P., Pound keeper.”

#### *Return of the Appraisers.*

“Pursuant to this warrant, the undersigned, being first sworn to the faithful performance of the trust to which we were appointed, and having given said A. B. reasonable notice as required, do hereby certify that we have viewed and do estimate said damages at — dollars and — cents and no more.

“E. F. }  
“G. H. } Appraisers.

“B. (date) 18—.”

And said person, being first sworn, shall give reasonable notice to the impounder, and the owner of such beast, if known and resident in the town, of the time appointed for the view, and proceed to estimate damages accordingly; and make return to the pound keeper of their doings in writing under their hands. The oath may be administered by said pound keeper, or a justice of the peace, and must be certified on the warrant.

Sec. 11. Whoever takes up, as an estray, in any public way or commons, or in his inclosure or possession, any such beast, shall within ten days, if no owner calls for him, commit him, with a certificate as described in section eight to the pound keeper of his town, who shall carefully keep him till called for by owner, and all due charges paid, or he is disposed of as hereinafter provided; and whoever does not so commit such beast shall lose the expense of his keeping, and forfeit one per cent. on his value for each week, after the ten days, until he so commits him, or the forfeiture amounts to his value.

Sec. 12. When a pound-keeper has so received any beast, he shall forthwith post and keep posted for three days at his dwelling-house, and in two other public places in his town, advertisements by him signed, stating the name of the impounder or finder, the time and cause of impounding, and a brief description of the beast, and notify the owner to pay lawful damages and charges, and take the beast away; and shall give the like public notice by the town crier, if any in the town. If the value of the beast exceeds ten dollars, a copy of such advertisement shall be inserted in some newspaper, if any, printed in the county.

Sec. 13. When a beast is lawfully impounded as aforesaid, if the forfeiture, damages, and costs are not paid, or the beast replevied, in ten days after the notice, provided in the preceding section, is given, the pound-keeper shall, without any other process, sell the beast at public auction, after having posted up in two public places in his town, at least forty-eight hours before the time of sale, notices of the time,



and place and cause of sale, with a brief description of the beast, and for posting such notices and making such sale, he shall have the same fees as constables for similar services.

Sec. 14. If the pound-keeper is informed, or has reason to believe, that the beast impounded has strayed from a drove, or does not belong to an inhabitant of the town, he shall adjourn the sale thirty days, and shall publish notice thereof in such papers as in his opinion may give information to the owner, and he shall be allowed a reasonable sum therefor; and the proceeds of such sale shall be disposed of as hereinafter provided.

Sec. 15. The pound-keeper, before making such sale, shall cause the damages, if any are claimed, to be appraised as in section ten within ten days after giving the notice required by section twelve.

Sec. 16. The pound-keeper shall retain his lawful charges and fees, and pay to others their lawful dues, and the balance to the treasurer of his county in thirty days. Such treasurer or his successor shall pay it over at any time within six years, on the written request of any person who proves that he was the owner of the property at the time of sale; and if he refuses to do so, the claimant may appeal to the county commissioners whose decision thereon shall be final. If such balance is not claimed in six years, it shall belong to the county.

Sec. 17. The owner of such beast, at any stage of the proceedings before sale, may redeem it on payment of all lawful claims thereon up to the time of his demand to redeem.

Sec. 18. An action to replevy such beasts shall be brought against the impounder or finder, and not against the pound-keeper, but a copy of it shall be served on both; and in other respects the process shall be regulated by chapter ninety-six. If such action is brought after notice of sale and before sale, the sale shall be postponed till it is decided, and no such action can be sustained unless the writ is served before sale.

Sec. 19. Whoever, in order to prevent the impounding of any beast lawfully in possession of another, and taken for



the causes herein mentioned, rescues him, or directly or indirectly causes his escape, shall forfeit not less than five, nor more than twenty dollars, and be liable in an action on the case to the party injured for the full damages, with charges and costs, which he might receive by impounding the beast.

Sec. 20. Whoever breaks a pound, or otherwise directly or indirectly delivers a beast from the place of his lawful restraint, shall forfeit to the use of the town not less than ten, nor more than fifty dollars; and be liable to the party injured or impounder, in an action on the case, for double the damage or forfeiture, which he might have received by impounding the beast; and when such acts are committed by a minor, or an apprentice, legally bound by deed, such action may be brought against the minor or apprentice, or against his parent or guardian, under whose care he then was.

Sec. 21. In an action for rescuing beasts distrained or impounded, the insufficiency of the fences, or other fact to show the distress or impounding illegal, shall not be given in defence, but the defendant may avail himself thereof in an action of replevin.

Sec. 22. Forfeitures mentioned in this chapter may be recovered in actions of debt to the use of the prosecutor, unless otherwise provided; and civil actions therefor must be commenced in ninety days after the forfeiture accrued, unless otherwise limited.

Sec. 23. The pound-keeper's fees shall be twenty-five cents for impounding one or more beasts at one time; twelve cents for recording each certificate or advertisement; and the same for posting or publishing each advertisement, with four cents a mile for necessary travel.

Sec. 24. The pound keeper shall allow the impounder a reasonable sum for his trouble, not exceeding half the respective forfeitures mentioned in sections two and three, besides the forfeitures to which he is entitled under those sections.

Sec. 25. The pound keeper's price for keeping and feeding the beasts committed to pound or to his custody as afore-

said, shall be fixed by the municipal officers, and recorded on the town books by the town clerk, and be binding until altered by said officers.

#### CONTAGIOUS DISEASES AMONG CATTLE.

Revised Statutes of 1871, Chapter 14.

Sec. 37. The municipal officers of towns, in case of the existence of the disease called lung murrain or pleuro pneumonia, or any other contagious disease, shall cause the cattle in their towns infected, or which have been exposed to infection, to be secured or collected in some suitable place or places therein, and kept isolated; and when taken from the possession of their owners, one-fifth of the expense thereof is to be paid by the town, and four-fifths at the expense of the state, such isolation to continue so long as the existence of such disease or other circumstances render it necessary; or they may direct the owners thereof to isolate such cattle upon their own premises, and any damages or loss sustained thereby shall be paid as aforesaid.

Sec. 38. The municipal officers, shall within twenty-four hours after they have notice of the existence of such disease, or have reason to believe that it exists, cause the suspected animals to be examined by a veterinary surgeon or physician, by them selected, and if they are adjudged diseased, they may order them to be forthwith killed and buried at the expense of such town.

Sec. 39. When so killed they shall cause them to be appraised by three competent and disinterested men, under oath, at the value thereof at the time of the appraisal, and the amount thereof shall be paid as provided in section thirty-seven.

Sec. 40. They may prohibit the departure of cattle from any enclosure, and exclude cattle therefrom.

Sec. 41. They may make regulations in writing to regulate or prohibit the passage from, to or through their towns, or from place to place therein, of any neat cattle, and may arrest and detain, at the cost of the owners thereof, all cattle found

passing in violation of such regulations, and may take all other necessary measures for the enforcement of such prohibition, and for preventing the spread of any such disease among the cattle in their towns, and the immediate vicinity thereof.

Sec. 42. Such regulations shall be recorded in the records of their towns, and shall be published in such towns in such manner as such regulations provide.

Sec. 43. Any person who sells or disposes of any animal infected or known to have been exposed to infection within one year after such exposure, without the knowledge or consent of the municipal officers, shall be punished by fine not exceeding five hundred dollars or by imprisonment not exceeding one year.

Sec. 44. Any person disobeying the orders of said municipal officers, made in conformity with the fortieth section, or driving or transporting any neat cattle contrary to the regulations made, so recorded and published, shall be punished as provided in section forty-three.

Sec. 45. Whoever knows or has reason to suspect the existence of any fatal contagious disease among the cattle in his possession or under his care, shall forthwith give notice thereof to the municipal officers, and for failure to do so, shall be punished as provided in section forty-three.

Sec. 46. Any town whose officers shall neglect or refuse to carry into effect the provisions of section thirty-seven, thirty-eight, thirty-nine, forty, forty-one, forty-two and forty-three, shall forfeit a sum not exceeding five hundred dollars for each day's neglect.

Sec. 47. All appraisals made under the provisions of section thirty-nine shall be in writing and signed by the appraisers, and shall be certified by the municipal officers to the governor and council, and to the treasurers of their towns.

Sec. 48. The municipal officers of towns may, when they deem it necessary to carry into effect the purposes of this chapter, take and hold possession for a term not exceeding one year, of any land within their towns without buildings



other than barns thereon, for inclosing and isolating any cattle, and they shall cause the damages sustained by the owners in consequence thereof, to be appraised by the assessors thereof, and they shall further cause a description of such land, setting forth the boundaries thereof, and the area as nearly as may be estimated, together with said appraisal, to be entered in the records of the town. The amount of said appraisal shall be paid as provided in the thirty-seventh section in such sums and at such times as they may order. If such owner is dissatisfied with the appraisal, he may, in an action of the case, recover from the town a fair compensation for the damages sustained by him; but no costs shall be taxed, unless the damages recovered in such action, exclusive of interest, exceed the appraisal of the assessors. And the state shall reimburse any town four-fifths of any sum so recovered.

Sec. 49. Whenever such disease exists in any town, the municipal officers shall forthwith give notice thereof to the governor and secretary of the board of agriculture; but if commissioners have been appointed as hereinafter provided, such notice shall be given to them.

Sec. 50. The governor may, when he deems it expedient, appoint commissioners who shall have full power to make all necessary regulations, and to issue summary orders relative thereto, for the treatment and extirpation of any contagious disease among cattle, and may direct the municipal officers to enforce and carry them into effect; and any such officer or other person refusing or neglecting to enforce, carry out and comply with any regulations of the commissioners shall be punished by fine as provided in section forty-three.

Sec. 51. When said commissioners shall make and publish any regulations, they shall supercede the regulations made by the municipal officers, during the time those made by the commissioners are in force.

Sec. 52. All losses and damages and reasonable expenses sustained in consequence of the execution of the orders of said commissioners, shall be appraised as provided in the thirty-ninth section, and as provided in the thirty-seventh section.

Sec. 53. The commissioners shall keep a record of their doings, and make report thereof to the next annual session of the legislature, on or before the tenth day of January, unless sooner required by the governor; and such record, or an abstract thereof shall be printed in the annual volume of transactions of the state board of agriculture.

Sec. 54. The governor, with the advice and consent of the council, may terminate the commission when, in his judgment, the public safety may permit.

#### BEEF AND PORK.

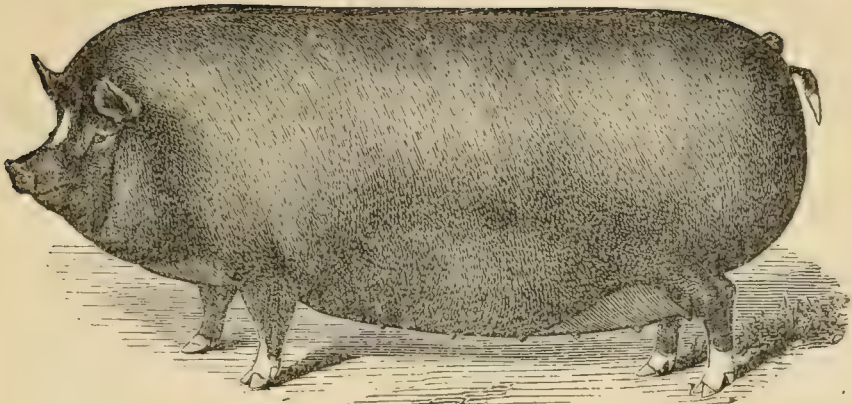
Revised Statutes of 1871, Chapter 38.

Sec. 1. The governor, with advice of council, when a vacancy occurs, shall appoint some skillful person to be inspector general of beef and pork, removable at pleasure; and he shall be sworn and give bond with sufficient sureties in the sum of four thousand dollars to the treasurer of state for the faithful discharge of his duties, before entering thereon.

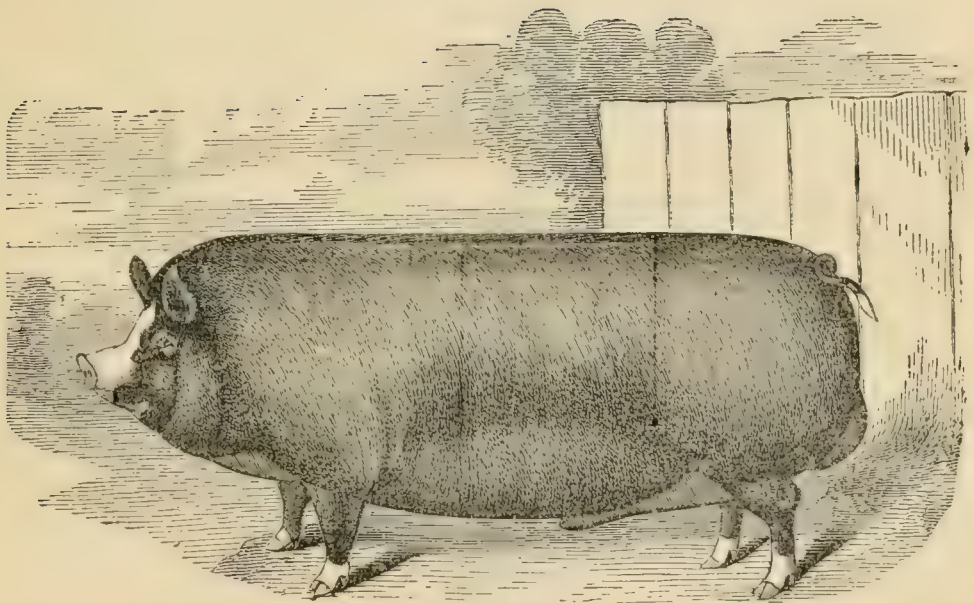
Sec. 2. The inspector general shall appoint one or more deputies in every port in this state, whence beef and pork are exported, and a convenient number in the several counties; and shall be responsible for their neglect or misconduct whilst acting under him; and when the office of inspector general becomes vacant, they may continue to discharge the duties of the office, until a successor is appointed; and they shall be accountable to the state.

Sec. 3. Every deputy shall be duly sworn and give bond to the inspector general, with sureties to his satisfaction, for the faithful performance of his duty, in a sum not less than three hundred, nor more than one thousand dollars; and the bond shall be so expressed as to inure to the use of the state, for the time the deputy exercises his duties during a vacancy in the office of inspector general.

Sec. 4. No inspector or deputy shall be concerned, directly or indirectly, in the beef or pork business, or in buying or selling it for barreling, so long as he holds such office. Any one violating the provisions of this section, shall forfeit twenty



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dollars, and forever after be disqualified from holding such office.

Sec. 5. The inspector general, within the county where he resides, or his deputy within the district for which he is appointed, shall, as soon as may be, within twenty-four hours after request, attend at any suitable place for the purpose of inspecting any quantity of beef or pork, or both, exceeding five barrels; and commence thereon, as soon as a convenient, strong, and secure place is provided by the party claiming such inspection, and the key thereof lodged with him; and it shall be his duty to keep the said key, until such beef or pork is packed, or repacked, salted, coopered, and branded, or otherwise prepared for exportation as provided in this chapter.

Sec. 6. Such officer shall not be liable for neglecting or refusing to commence upon any inspection or other service, before all the charges for inspecting, cutting, salting, coopering, and branding such beef or pork are either paid or satisfactorily secured to him.

Sec. 7. When the inspector or his deputy has inspected and assorted any beef or pork, as hereinafter directed, he shall with the assistance, if necessary, of laborers and coopers in his employ, and for whose conduct he shall be responsible, cut, weigh, pack, salt, and cooper said beef and pork in barrels or half barrels, as hereinafter required.

Sec. 8. No beef shall be packed or repacked in barrels or half barrels for exportation, unless it is of fat cattle not under two years old; and all such beef shall be cut into pieces, as nearly square as may be, and of not more than eight nor less than four pounds in weight, except where otherwise expressly provided.

Sec. 9. Excepting as provided in the tenth and twelfth sections, all beef which the inspector or his deputy on examination finds to have been killed at a proper age, and otherwise good and merchantable, shall be by him divided into five different sorts for packing or repacking; to be denominated and branded mess, number one, prime, cargo, and hearts and cheeks.

Mess beef shall consist of oxen, cows, and steers well fattened of three years old and upwards, and weighing six hundred pounds and upwards; the shin, shoulder, clod and neck shall be taken from the fore quarters, and the leg and leg round from the hind quarters; and each barrel and half barrel, containing beef of this description, shall be branded on one of the heads with the words, "mess beef."

Number one shall consist of oxen, cows, steers, and heifers not under three years old and weighing not under four hundred pounds, and to average five hundred and twenty pounds, without any necks or shanks. On one head of each barrel or half barrel, containing beef of this description, shall be branded "number one."

Prime beef shall consist of fat cattle of all descriptions, not before mentioned, of two years old and upwards, bulls excepted, with not more than half a neck, and two shanks, and without any hocks; each barrel and half barrel of which shall be branded, "prime beef."

Cargo beef shall consist of those parts of beef, which are excluded from mess, number one, and prime, not including hearts and cheeks; and shall be packed and inspected by the inspector general, or his deputy, in the same manner as No. 1, or prime, and branded "cargo beef;" first taking from the parts excluded as aforesaid, namely, from the end of the neck not less than four pounds nor more than six, and from the shank and shin of each quarter not less than four pounds nor more than eight; which pieces thus taken off shall not be exported from this state.

The hearts and cheek pieces of beef may be inspected and packed as aforesaid, and shall be branded, "hearts and cheeks."

Sec. 10. The inspector or his deputy may also, at the request of the owner or agent, inspect and pack the following descriptions of beef, viz:

Oxen of four years old and upwards and weighing seven hundred pounds and upwards, excluding the same parts as for mess beef, to be branded "extra mess;" and



Choice pieces of oxen, steers, cows, and heifers, of three years old and upwards, weighing four hundred pounds or more, and to average five hundred and fifty pounds, excluding the parts aforesaid, to be cut into pieces of as nearly ten pounds as practicable, and to be branded "navy mess."

Sec. 11. Every barrel of beef shall be well salted with seventy-five pounds of clean St. Ubes, Isle of May, Lisbon or Turk's Island salt, or eighty pounds of Liverpool salt, or other salt of equal quality, exclusive of a pickle made of fresh water as strong as salt will make it; and to each barrel of mess, extra, or navy beef, shall be added not more than four, nor less than three ounces of saltpetre; and to each barrel of number one, prime, and cargo beef, shall be added not more than three, nor less than two ounces; and for every half barrel of beef of the different kinds, one-half of the stated quantity of salt and saltpetre shall be used.

Sec. 12. Any person, packing beef under the supervision of the inspector general or his deputy, may reserve for smoking, jerking, or other purposes, the round, being that part of the leg cut from the hind quarter near to the edge bone, and the neck and chines of the fore quarter, cut as provided in the tenth section; and the beef so reserved shall be at the disposal of the owner either for consumption, or to export in hogsheads, or in any other mode of packing; and he may put into each barrel of beef or pork a less quantity of salt than is provided in section eleven, and the same shall be branded "light salted;" but he shall give a good and sufficient bond to the inspector or his deputy to save him harmless from all liabilities and costs in consequence of such light salting.

Sec. 13. Excepting as provided in the next section, all pork packed, or repacked, in barrels or half barrels for exportation, shall be divided into seven different sorts, to be denominated and branded, respectively, extra clear, clear, bone middlings, navy mess, number one, prime and cargo pork; and in all cases the following parts shall be taken out as refuse, viz.: nose pieces or faces, ears, brains, tail, feet, and lard.

The two kinds of clear pork shall consist of the best pieces of large well fatted healthy hogs, weighing three hundred pounds or upwards, free from bones or the lean part of the meat, excepting the ends of the ribs and the brisket; and extra clear pork shall consist of such pieces, not less than three and a half inches thick, in the thickest part of such pieces, clear of lean; and the clear pork of such pieces not less than two inches and a half thick, in the thickest part of such pieces, clear of lean.

Bone middlings shall consist of middling pieces taken from hogs well fatted weighing two hundred and thirty pounds and upwards.

Navy mess pork shall consist of all parts of the carcass, well fatted, weighing from one hundred and sixty pounds to two hundred and thirty pounds; except the head, fore and hind legs, the shoulder joint, lard, and refuse parts above mentioned.

Number one shall consist of all parts of hogs well fatted averaging two hundred and twenty pounds or upwards, and each weighing not less than one hundred and eighty pounds, and to have no more heads, legs, shoulders, or other coarse parts, than belong to one carcass, deducting the lard and refuse as above.

Prime pork shall consist of all parts of one and a half hog well fatted, which shall weigh two hundred pounds, deducting the lard and refuse as above; and if in half barrels, it shall consist of pig pork, all parts of one carcass or not, excluding the lard and refuse as above. In all cases, where the legs of pork are taken out for any other purpose, the weight shall not be made up of heads and shoulders, but with other parts of the carcass, not less valuable than the legs would be, if salted.

Cargo pork shall consist of the merchantable parts of wholesome pork of quality inferior to prime pork, and there shall not be more than the merchantable parts of two carcasses of pork in one barrel; except where any of the legs are taken out, the same number of shoulder pieces and no more may be



added; the deficiency of weight to be made up in better parts of a carcass of pork.

Sec. 14. Barrels or half barrels filled with pork heads or feet shall be so branded; and the inspector general or his deputy, at the request of the owner or agent, may inspect, cut, weigh, pack, or repack, salt, cooper or brand, pork of the following description, which shall be branded mess pork; viz.: every part, except the heads, legs, shanks and lard, of well fattened hogs, in good condition, weighing from two hundred to three hundred pounds, and averaging two hundred and fifty pounds.

Sec. 15. Every barrel of pork shall be well salted with seventy pounds, and every half barrel with thirty-five pounds, of clean coarse salt, exclusive of a strong pickle, except as provided in section twelve; shall be branded on one of the heads with the quality of the pork it contains; and each barrel of beef or pork for exportation shall contain two hundred pounds; and each half barrel one hundred pounds; and the casks shall be made of good, seasoned, rift white oak, white ash, or maple staves and headings, free from any defect.

Sec. 16. The beef barrels shall measure not less than sixteen, nor more than sixteen and a half inches between the chimes; and be not less than twenty-eight, nor more than twenty-eight and a half inches long, to be covered three-fourths of the length with good oak, ash, elm, leverwood, or walnut hoops, leaving one-fourth in the centre; the heads and staves to be of a proper thickness; the hoops to be well set and driven together.

The half barrels shall contain not less than fifteen nor more than fifteen and a half gallons, to be hooped like barrels.

Sec. 17. The pork barrels shall measure seventeen inches and one-quarter between the chimes, and contain not less than thirty-one gallons nor more than thirty-one gallons and one-half; and be hooped like beef barrels; and all the beef and pork barrels and half barrels aforesaid shall be branded on the bilge with the manufacturer's name.



Sec. 18. Every barrel and half barrel of pork and beef, packed or repacked for exportation, shall be branded with the initials of the christian and the whole of the surname of the inspector, who inspected the same, with the name of the town where, and the month and year, in full, or intelligibly abridged, in which inspected, and the actual weight in legible letters and figures, with the addition of the word, Maine. Every barrel or half barrel of beef, marked extra mess, navy mess, number one, or prime, or of pork, marked extra clear, clear, bone middlings, or navy mess, shall be branded with the name of the person for whom the same was packed.

Sec. 19. Neither the inspector general nor his deputy shall brand any packages of beef or pork, other than those he has personally inspected, and caused to be weighed and packed, as the law requires; nor, his fees being duly tendered or secured to him, shall he neglect to perform any duty pertaining to his office; or be guilty of any fraud in the exercise thereof, under penalty of ten dollars for each offence.

Sec. 20. No deputy shall inspect or brand any cask of beef or pork out of the district for which he was appointed, under penalty of fifty dollars; and no person, other than the inspector and his deputies, shall stamp or brand any cask of beef or pork, with the intent that the same shall pass as inspected and branded according to law, under penalty of twenty dollars for each offence.

Sec. 21. When any beef is reserved for exportation agreeably to the provisions of the twelfth section, the hogshead or other package containing it, when exported, shall be branded on one head with the name of the owner and of the town where he resides, under the penalty of one dollar for each package not branded; and the feet, ears, and faces of pork, when separated from the cheek part of the head, or any other pieces herein prohibited, shall not be exported under the brand "refuse," or any other brand, allowed for pork to be exported.

Sec. 22. If any person intermixes, takes out, or shifts, any beef or pork, out of any cask inspected or branded as hereby

required, or puts in any other beef or pork for sale or exportation with a fraudulent intent, he shall forfeit twenty dollars for each offence.

Sec. 23. No pork or beef, except hams reserved for pickling or smoking, packed in this state or imported into it in barrels, half barrels, or other casks not bearing the name and brand of an inspector of some one of the United States, showing the quality and quantity thereof, shall be transported out of the state, or shipped, sold, or offered for sale therein, for exportation, under a penalty of ten dollars for each package; nor shall any salted beef or pork be exported from the state, unless the master or owner of the vessel produces to the collector or other officer of the United States, granting a clearance, a certificate from the inspector general or his deputy, that it is inspected and branded according to law, and each certificate shall express the number of barrels and half barrels of beef or pork of each sort; and, on producing such certificate, he shall take and subscribe the following oath before said officer, namely:

"I, A. B., master (or owner as the case may be) of the—, do swear, that according to my best knowledge and belief, the certificate hereunto annexed, contains the whole quantity of salted beef (or pork as the case may be) on board the —, — master; and that no salted beef, or pork, is shipped on board the said vessel for the ship's company, on freight or cargo, but what is inspected and branded, according to the law of this state."

Sec. 24. When any beef or pork, packed in barrels, half barrels, or casks, not bearing the name or brand of an inspector of this state or some one of the United States, is sold or offered for sale in this state, the purchaser thereof may, at the time of purchase, demand an inspection conformable to the laws of this state, and in case of refusal or neglect of the seller to cause the same to be properly inspected and branded, and to pay all charges thereon, he shall forfeit and pay not less than ten dollars for each package sold, to be recovered as provided for in section thirty-five; but the purchaser shall be



entitled to damages for any deficiency in quality or quantity, if purchased without inspection.

Sec. 25. If any person exports or ships for exportation out of this state any salted beef or pork, not inspected and branded, as herein directed, every owner or shipper thereof privy to such offence, shall forfeit six dollars, and the master of every vessel, having on board such uninspected beef or pork, two dollars, for every such cask.

Sec. 26. Any trial justice on complaint made to him, that any such beef or pork is put on board any vessel in his county for exportation, may issue his warrant directed to the proper officer, requiring him to seize and secure the same for trial; or the inspector general or his deputy may, on like information, seize and secure the same for trial.

Sec. 27. The officer, making such seizure, shall, as soon as may be, file a libel or information thereupon in any court proper to try the same; and if upon trial it appears that such beef or pork was thus shipped against the provisions hereof, it shall be liable to forfeiture according to law; one-half to the use of the state, and the other to the use of the officer seizing and prosecuting therefor.

Sec. 28. Every deputy inspector shall make an annual return to the inspector general of the number of barrels and half barrels of beef and pork inspected by him; and the inspector general in the month of January annually, shall make a return, up to the first day of December, into the office of the secretary of state, of the whole number of barrels and half barrels inspected by him and his deputies the preceding year, under each of the respective brands used by them; designating in the return the different sorts, and places where inspected.

Sec. 29. The inspector general may administer the several oaths required of his deputies or of others, pertaining to the business of his office.

Sec. 30. No beef or pork shall be weighed by the owners or keepers of any slaughter-houses, stores, or warehouses, or by persons under their control in the transaction of their



business, in any greater quantity than fifty pounds, unless in scales and with weights, or by the vibrating steelyard invented by Benjamin Dearborn, the vibrating steelyard invented or improved by Samuel Hills, or the Fairbanks' scales, sealed according to law, under penalty of ten dollars.

Sec. 31. The municipal officers of towns, where beef cattle are sold for immediate consumption or for barreling, shall appoint one or more suitable persons not dealers in cattle, to be weighers of beef, and they shall be duly sworn.

Sec. 32. All beef sold as aforesaid, shall be weighed by the sworn weighers, and certificates of the weight of all the beef, hide, and tallow of each head of cattle shall be signed by said weighers, and delivered to the seller thereof in the form following, viz. :

"This certifies, that I have duly weighed the cattle, bought by ———, of ———, from ———, of ———, this ——— day of ———, 18— :

Beef, . . .					
Hide, . . .					
Tallow, . .					
Total, . . .					

"A. B., *Sworn Weigher*.

Sec. 33. Any person, purchasing beef cattle for market or exportation not weighed pursuant to the foregoing provisions, other than live cattle, and except when the weight or mode of weighing is agreed upon expressly by the buyer and seller, shall forfeit thirty dollars for each offence.

Sec. 34. The inspector general and his deputies, by themselves or by other persons by them appointed and sworn, shall weigh all hides taken from cattle slaughtered for barreling, making reasonable deduction for tare and drainage ; and give a certificate, specifying the gross weight and the deductions made as aforesaid.

Sec. 35. All the foregoing fines and forfeitures, not herein otherwise provided for, may be recovered by action of debt,

complaint, or indictment, in any competent court, one-half to the person prosecuting, and the other to the town where the offence is committed.

#### FLOUR.

Revised Statutes of 1871, Chapter 38.

Sec. 36. The municipal officers of towns may appoint annually in their towns, one or more suitable persons not interested in the manufacture and sale of flour, to be inspector thereof for the period of one year from the date of appointment.

Sec. 37. Such inspector before entering upon the duties of his office, shall be sworn to the faithful and impartial discharge of the same before the town clerk who shall give him a certificate of his appointment and qualification, upon payment of a fee of fifty cents, which shall be exhibited on the demand of any person interested in any inspection made by him.

Sec. 38. Inspection of flour shall be for the purpose of ascertaining its soundness; and every package inspected shall be opened sufficiently to allow a trier to be passed through it, and a sample of the whole length of the passage shall be taken out and examined by the inspector, who shall mark upon each package with a brand, or stencil, the word sound or the word unsound as the quality of the flour contained in each shall be found, and his name, residence, office, and the year of inspection. He shall keep a record of all flour inspected by him, in a book kept for that use, which he shall exhibit to any person requiring it.

Sec. 39. Every inspector who falsely and fraudulently marks any package of flour, shall be punished by a fine of five dollars for each package so marked, and shall forfeit to any person injured thereby, three times the amount of damage, to be recovered in an action of debt.

Sec. 40. Every person who, with intent to defraud, alters, obliterates or counterfeits the marks of any inspector, and every person who, with such intent, places upon any

package of flour, marks which falsely purport to be inspection marks shall, for every offence be punished by fine not exceeding fifty dollars, and on conviction of so doing on as many as ten packages at one time, shall also be punished by imprisonment in the county jail not exceeding ten months.

Sec. 41. Any person buying flour, may require it to be inspected before it is delivered. The fees of the inspector shall be five cents a package, for lots of less than ten packages; for lots of more than ten and not exceeding twenty packages, two cents a package; and for any and every package exceeding twenty, one cent, to be paid by the person demanding inspection.

Sec. 42. The inspectors of flour shall, when required, determine whether it conforms to and equals the sample furnished to them, and shall mark, with some distinct and intelligible mark, the packages that are found like the sample, and for this service they may charge an additional compensation of one half cent per package.

Sec. 43. Nothing herein contained shall be held to prohibit, or render illegal any contract for the manufacture, or sale of flour, which has not been inspected, when inspection is not required by the buyer or the seller.

#### MILK.

Revised Statutes of 1871, Chapter 38.

Sec. 44. The municipal officers of towns containing not less than three thousand inhabitants shall, upon the application of ten legal voters therein, annually appoint one or more persons to be inspectors of milk, who shall, before entering upon the discharge of their duties, be sworn, and shall give notice of their appointment by publishing the same two weeks in a newspaper published in their towns, or if no newspaper is published therein, by posting up such notice in two or more public places in said towns.

Sec. 45. Inspectors shall keep an office and books for the purpose of recording the names and places of business of all persons engaged in the sale of milk within their limits. They



may enter any place where milk is kept or stored for sale, and examine all carriages used in the conveyance of the same, and when they have reason to believe any milk found therein is adulterated, they shall take specimens thereof, and cause the same to be analyzed, or otherwise satisfactorily tested, the result of which they shall preserve as evidence, and shall prosecute for all violations of the two following sections.

Sec. 46. All measures, cans or other vessels used in the sale of milk shall annually be sealed by the sealer of weights and measures, by wine measure, and shall be marked by the sealer with figures indicating the quantity which they hold, and whoever fraudulently sells by any other measure, can or vessel, shall forfeit twenty dollars for each offence.

Sec. 47. Whoever, acting for himself or as the employee of another, knowingly or willfully sells or offers for sale, milk, from cows diseased, sick, or fed upon the refuse of breweries or distilleries, or upon any substance deleterious to its quality, or milk to which water is added, or any foreign substance, shall forfeit twenty dollars for the first, and fifty dollars for every subsequent offence; to be recovered by complaint or indictment before any court having jurisdiction of the same, to the use of the town where the offence is committed.

#### COMMERCIAL MANURES.

Revised Statutes of 1871, Chapter 38.

Sec. 48. Commercial manures sold or kept for sale in this state shall have affixed to every barrel, bag or parcel thereof which may contain fifty pounds or upwards, a printed label, which shall specify the name of the manufacturer or seller, his place of business, and the per centage which it contains of the following constituents, to wit: of soluble phosphoric acid, of insoluble phosphoric acid, and of ammonia; and whoever violates this provision, or affixes labels specifying a larger percentage of either of such constituents than is contained therein, shall be punished by a fine of ten dollars for the first, and twenty dollars for the second and each subse-

quent offence; to be recovered on complaint before any tribunal of competent jurisdiction.

Sec. 49. Any purchaser of commercial manures bearing such label and containing less percentage than stated therein, may recover from the seller, in an action for debt, twenty-five cents for every pound of soluble phosphoric acid, six cents for every pound of insoluble phosphoric acid, and thirty-five cents for every pound of ammonia deficient therein.

Sec. 50. By the term soluble phosphoric acid, whenever used, is meant such acid in any form or combination readily soluble in pure water; and by the term insoluble phosphoric acid, is meant such acid in any combination which requires the action of acid upon it to cause it to become readily soluble in pure water.

Sec. 51. The three preceding sections shall not apply to porgy chum, nor any manure prepared exclusively from fish and sold as such, nor to any commercial manure which is sold at a price not exceeding one cent per pound.

#### HAY.

Revised Statutes of 1871, Chapter 38.

Sec. 52. All hay, pressed and put up in bundles for sale in this state, shall be branded on the bands or boards enclosing it with the first letter of the christian and the whole of the surname of the person putting up the same, and with the name of the state and of the place where such person lives; and all pressed hay offered for sale or shipping, not thus branded, shall be forfeited, one-half to the use of the town where the offence is committed, and the other half to the person libeling the same.

Sec. 53. Every bale of screwed or pressed hay may have four pieces of seasoned board not more than four inches wide or one inch thick to keep the hay in place, one of which, or on one of the bands, shall be marked the weight and tare of the bale, and such tare exceeding twelve pounds shall be deducted when the hay is sold in bundles. No sworn weigher

of hay shall purchase more hay than is necessary for his own use.

Sec. 54. If the master of any vessel takes on board pressed hay not branded as aforesaid, he shall forfeit two dollars for each bundle so received, to be recovered to the uses mentioned in section fifty-two.

#### MEASURERS OF SALT, CORN AND GRAIN.

Revised Statutes of 1871, Chapter 38.

Sec. 55. The municipal officers of towns are authorized annually to appoint measurers of salt, corn and grain therein, who shall be duly sworn, and receive such fees from the purchaser, as said officers establish; and in every contract made in this state for the sale of salt by the hogshead, such hogshead shall consist of eight bushels; and, when the buyer or seller requests, salt, corn, or grain in places where such measurers live, shall be measured by them.

#### WEIGHT OF CORN, AND GRAIN, MEAL, VEGETABLES, AND HAIR.

Revised Statutes of 1871, Chapter 38.

Sec. 56. The standard weight of a bushel of potatoes in good order and fit for shipping shall be sixty pounds; of wheat, sixty pounds; of corn, fifty-six pounds; of barley and buckwheat, forty-eight pounds; of carrots, fifty pounds; of onions in good order and fit for shipping, fifty-two pounds; of ruta бага, sugar beets, mangel wurzel, and turnip beets in like condition, sixty pounds; of English turnips in like condition, fifty pounds; of beans, sixty-four pounds; of peas, sixty pounds; of rye and indian meal, fifty pounds; of oats, thirty pounds, or strike measure; and of hair used in masonry, well dried and cleansed, eleven pounds; and the measure of each of these articles shall be determined as aforesaid at the request of the vender or vendee; and if either party refuses so to do, he shall forfeit twenty cents for each bushel, to the person prosecuting therefor within thirty days.



## BOUNTY ON SILK.

Revised Statutes of 1871, Chapter 38.

Sec. 57. The treasurers of towns shall pay a bounty of ten cents for every pound of cocoons, and one dollar for every pound of silk reeled from cocoons, raised in this state, to the person raising it in such town, on being furnished with satisfactory proof thereof; and such applicant shall make oath, that no bounty had been received by any person for such cocoons or silk; and each treasurer shall keep an account of the money so paid, and present it, verified by his oath, to the legislature next thereafter, and being found correct, it shall be allowed and paid from the state treasury.

## MARKING SHEEP.

Revised Statutes of 1871, Chapter 38.

Sec. 58. All owners of sheep shall mark them with some distinctive mark, by a cut in the ears, or a brand on some part of the animal, and cause such mark to be recorded by the clerk of their town in a book kept for that purpose, paying the clerk eight cents therefor.

## WEIGHTS AND MEASURES.

Revised Statutes of 1871, Chapter 43.

Sec. 1. The standard of weights and measures furnished by the United States and adopted by this state shall continue the standard of weights and measures for the state; and the state sealer of weights and measures shall cause all such weights and measures of a smaller denomination than those furnished by the United States, as are necessary to make a complete set, to be compared and regulated by the standards aforesaid; and keep, at the expense of the state, a suitable standard balance for gold, and also for avoirdupois weights, to be kept with the weights and measures at the state house, and used only for regulating other weights and measures.

Sec. 2. The treasurer of state, at the expense of the state, shall procure and preserve as public standards, until other-

wise provided, in the manner mentioned in the first section, and which shall be used only as such, the following beams, weights, and measures, to wit: one bushel, one half bushel, one peck, one half peck, one ale quart, one wine gallon, one wine half gallon, one wine quart, one wine pint, one wine half pint, and one wine gill; said measures to be made of copper or pewter, conformable as to contents to said standard measures; and the diameter of the bushel shall not be less than eighteen inches and a half, containing thirty-two Winchester quarts; of the half bushel, not less than thirteen inches and three-quarters, containing sixteen Winchester quarts; of the peck, not less than ten inches and three-quarters, containing eight Winchester quarts; and of the half peck, not less than nine inches, containing four Winchester quarts; the admeasurement to be made in each instance in the inside; also one ell, one yard; one set of brass weights, to four pounds, computed at sixteen ounces to the pound, with fit scales and steel beam; also a good beam and scales, and a nest of troy weights, from one hundred and twenty-eight ounces, down to the least denomination, with the weight of each weight, and the length of each measure, marked or stamped thereon, and sealed with a seal, to be procured and kept by the treasurer aforesaid; and also one fifty-six pound weight, one twenty-eight pound weight, one fourteen pound weight, and one seven pound weight, made of iron.

Sec. 3. The treasurer of each county, at the expense thereof, shall have one complete set of beams, and of brass, copper, pewter, and iron weights, and of the measures before mentioned, except the bushel measure, proved and sealed by the state standards, and conformable thereto in breadth and contents; and preserve them for the use of such county only as standards; and once in every ten years, commencing July first, eighteen hundred and thirty-nine, he shall have them compared, proved, and sealed by the state standards; and for each neglect of his duty aforesaid, he shall forfeit two hundred dollars, to be recovered in an action of debt in the name of the state.

Sec. 4. The treasurers of towns, at the expense thereof, shall constantly keep a town seal, and, as town standards, a complete set of beams, weights, and copper and pewter measures, conformable to the state standards, except that the bushel measure, and the half bushel, peck and half peck measures may be of wood instead of copper or pewter, but of the same dimensions, and except also a nest of troy weights other than those from the lowest denomination to eight ounces; they shall cause all beams, weights and measures, belonging to their towns, to be proved and sealed by the state or county standards once in ten years, computing from July first, eighteen hundred and forty; and for every neglect of duty aforesaid they shall forfeit one hundred dollars, half to the use of the town, and half to the use of the person suing therefor.

Sec. 5. The municipal officers of each town shall annually appoint a sealer of weights and measures therein, removable at pleasure, and have power to fill any vacancy that occurs; and for each month's neglect of this duty, they shall severally forfeit ten dollars to be appropriated as in the preceding section. Any city may purchase and keep for use scales for weighing hay and other articles, appoint weighers and fix their fees, to be paid by the purchaser.

Sec. 6. If any person, so appointed and notified thereof, refuses for seven days to accept the office and be sworn, he shall forfeit five dollars, to be appropriated as in section four; but when sworn, he shall receive the standards and seal from the treasurer, giving a receipt therefor, describing them and their condition, and therein engaging to re-deliver them at the expiration of his office in like good order; and he shall be accountable for their due preservation while in his possession.

Sec. 7. Every such sealer shall annually, in the month of May, post notices in different parts of his town stating the times and places, at which he will attend to the proof and sealing of weights and measures; shall deface or destroy all



weights and measures that are not or cannot by him be made conformable to the standard; shall visit the houses of innholders, the warehouses and stores of merchants, and the dwelling houses of such other inhabitants, as neglect to send to him their weights and measures, and there prove and seal the same; and every sealer, neglecting any duty herein required of him, and every person neglecting or refusing to have his weights and measures proved and sealed as aforesaid, shall forfeit ten dollars, to be appropriated as in section four.

Sec. 8. In all cases of weighing, the vibrating steelyard invented by Benjamin Dearborn, or the vibrating steelyard invented by Benjamin Dearborn and improved by Samuel Hills, or the Fairbanks Scale, may be used; but before being offered for sale, or used, each beam and the poises thereof shall be sealed by a public sealer of weights and measures, appointed according to law.

Sec. 9. All measures, by which fruit and other things, usually sold by heaped measure, are sold, shall be conformable in capacity and breadth, to the public standard; and if any person otherwise sells or exposes to sale any such fruit or other thing, any goods or commodities whatever by any other beams, weights, or measures than those proved and sealed as aforesaid, he shall forfeit for each offence not less than one dollar nor more than ten dollars; one-half to the use of the town, and the other to the sealer, or to him who prosecutes therefor.

Sec. 10. Such articles as are sold or exchanged in any market or town in this state by gross or avoirdupois weight, shall be sold or exchanged as follows; twenty-five avoirdupois pounds constitute one quarter; four quarters, one hundred; and twenty hundreds, one ton; and all other articles usually sold by decimal hundred.

Sec. 11. The fees of sealers of weights and measures for trying and proving beams, weights and measures by the town standard, shall be as follows, to be paid by the person for whom the service is rendered: for a platform or hay scale weighing six thousand pounds or more, one dollar; for one

weighing one thousand pounds and under six thousand, fifty cents; for a platform scale weighing six hundred pounds and under one thousand, twenty-five cents; for one weighing less than six hundred, ten cents; for any other scale or steelyard that weighs with a poise, five cents; for each dry measure and for all other weights, measures, scales or beams, three cents each; and a reasonable compensation for all repairs, alterations and adjustments necessary to make the same conformable to the town standard.

#### MERIDIAN LINES.

Revised Statutes of 1871, Chapter 42.

Sec. 12. The county commissioners, at the expense of their county, within two years from the eleventh day of March, one thousand eight hundred and sixty-nine, and within six months after the formation of a new county, shall erect, in their counties, on land owned by the county or for that purpose acquired by them, at such place or places as the public convenience requires, a true meridian line, to be perpetuated by stone pillars with brass or copper points firmly fixed on the tops thereof, indicating the true range of such meridian; and shall enclose and protect the same, and provide a book of records to be kept by the clerk of the courts, or by a person appointed by them nearer to such structure, and accessible to all persons wishing to refer thereto.

Sec. 13. Such structures shall be under the care and custody of the clerk of the courts; and any surveyor or civil engineer residing in said county or engaged in surveying therein, shall have free access thereto for the purpose of testing the variation of the compass.

Sec. 14. Every land surveyor shall, at least annually, adjust and verify his compass by the meridian line so established in the county where his surveys are to be made, and shall enter the variation thereof from the true meridian line in the book mentioned in section twelve, and subscribe his name thereto for future reference; and shall also insert in his field notes, the true as well as magnetic bearings of the lines



of his surveys, and the day on which they were made; under a penalty of ten dollars for each offence, to be recovered on complaint, in the county where the survey is made, one-half to the complainant and the other to the county; but no surveyor living on an island not connected with the main land by a passable bridge, shall be required to go beyond its limits to verify his compass, for the purpose of making surveys thereon.

Sec. 15. Whoever willfully displaces, alters, defaces, breaks or otherwise injures any of the pillars or points, enclosures, locks, bars, bolts or any part of said structures, shall be liable to a penalty not exceeding a hundred dollars, to be recovered by indictment, one-half to the prosecutor and the other to the county.

Sec. 16. When such meridian is so established in any county, the governor and council shall appoint a competent commissioner to inspect and verify it by astronomical observations, who shall make a report of his doings, with an accurate description of such structure, its latitude and longitude, and the declination of the needle at the time, and deposit a record thereof with the clerk of the court for such county, and shall be entitled to such just compensation for his services as the governor and council may allow.

#### SALES OF REAL ESTATE.

Revised Statutes of 1871, Chapter 71.

Sec. 1. Judges of probate, in the counties where the applicants hereinafter named were appointed, may license the sale, leasing or exchange of real estate and any interests therein in whatever county situated, in the following cases, on application:

*First.*—Of executors or administrators, for power to sell so much of such estate of the deceased as is necessary to pay debts, legacies, and expenses of sale and of administration.

*Second.*—Of the friends or guardians of minors and other incapacitated persons, that the guardians, or some other suitable persons, may be authorized to sell real estate of their



wards, or any trees or timber standing thereon, for the payment of debts, expenses of sale and of guardianship, and for the support of their wards, and to provide a reasonable sum in anticipation of accruing expenses, when there is not sufficient personal property therefor, exclusive of such as the judge may deem proper to reserve for the use of said wards; or to sell the same and place the proceeds at interest; or to sell it for two or more of these purposes; or to lease such real estate for any term of years, or exchange it for other real estate, when it clearly appears that such sale, lease or exchange would be for the benefit of the wards. But when licensed to be sold in order to place the proceeds at interest, any part thereof may be used for the support of the wards if it becomes necessary.

*Third*—Of executors, administrators, or guardians, when it appears by the petition and proof exhibited, that the residue would be greatly depreciated by a partial sale of any entire portion under the foregoing authority, to sell the whole, or such entire parts thereof, as will not injure the residue.

*Fourth*—Of a husband or guardian of an insane wife resident in the county, to sell, on such terms and conditions as the judge thinks proper, for a sufficient consideration, any real estate held by him in right of his wife, or any of her rights of dower.

*Fifth*—Of executors or administrators, to sell wood and timber standing on the real estate of their testator or intestate, for the payment of debts, when it clearly appears to the judge to be for the advantage of those interested in the estate.

*Sixth*—Of executors or administrators, to sell as real estate the interest which their testator or intestate had in a land warrant issued by virtue of any act of congress, when not disposed of by will, and distribute the net proceeds thereof among those entitled by law to such interest.

*Seventh*—Of guardians, when a highway, railroad or canal is authorized to be constructed through the lands of any ward,

or a dam is constructed by which such lands are liable to be flowed, to give, for a reasonable compensation, a full release of such ward's claim for damages, which shall be binding on the ward and his heirs forever.

*Eighth*—Of executors or administrators, to sell real estate held in mortgage, or taken on execution, and the right of redemption foreclosed, when it appears to be for the benefit of the parties in interest, and to distribute the proceeds as in other cases of personal estate.

*Ninth*—Of public administrators, after three years from the granting of administration, to sell any or all of the real estate of the deceased, when it appears to be for the interest of all concerned, and that no heir or other person interested therein, except creditors, can be found in the United States.

*Tenth*—Of a part or all of the heirs living in different states, of a person deceased, who left real estate in this state undevise, the owners of which cannot dispose of their separate interests without loss, that the executor, administrator or other suitable person be authorized to sell such estate, and distribute the proceeds, after paying expenses, amongst such heirs, according to their respective rights therein; unless, after public notice, the first publication to be thirty days prior to the hearing, or longer if the judge deems it necessary, any owner objects to such sale, and if so sold, the share of any absent owner shall be placed on interest until called for by him or his legal representatives.

#### SALES AT AUCTION.

Revised Statutes of 1871, Chapter 71.

Sec. 2. All the sales aforesaid shall be at public auction, except as hereinafter provided, and the decision of the judge of probate on such applications may be appealed from, as in other cases; and the supreme judicial court shall have original and concurrent jurisdiction with the probate court in all the cases aforesaid.

Sec. 3. All persons licensed as aforesaid, before proceeding to make such sales, leases or exchanges, shall give bond

to the judge of probate for a sum, with sureties to his satisfaction, with the following conditions :

*First.*—That they will observe all the provisions of law for the sale, leasing or exchange of such real estate or interests therein, and use due diligence in executing the trust.

*Second.*—That they will truly apply and account for the proceeds of sale or lease according to law.

Sec. 4. Before fixing upon the time and place of sale, leasing or exchange, they shall be duly sworn before the judge of probate, or before some justice of the peace, whose certificate shall be returned to the judge, and filed and recorded by the register.

Sec. 5. No license shall be granted for the sale of any such real estate, of the value of more than fifty dollars, unless by the written consent of all persons interested therein, until after public or personal notice of the time and place of hearing, to all persons interested in the property, to appear and object if they see cause. If any party interested resides without the state, such special notice may be given as the court directs.

Sec. 6. Nor shall such license be granted, if any of the parties, interested in such estate, gives bond to the executor, administrator, or guardian, in a sum and with sureties approved by the court, to pay all sums, for the payment of which license is asked, so far as the goods and chattels, rights and credits of the deceased or ward are insufficient therefor ; but such bond shall not bar any future application for the same purposes, if the obligors, on reasonable notice and demand fail to perform its condition.

Sec. 7. Every person licensed as aforesaid, previous to such sale, shall give thirty days' notice thereof, by posting up notifications in some public place in the town where the estate lies, and in two adjoining towns, and in the town where the said deceased last dwelt, or where the ward resides, if within the state ; or by causing an advertisement thereof to be published three weeks successively in such newspaper as



the court, authorizing the sale, orders; the first publication to be thirty days before the sale.

Sec. 8. Every application for the sale of any estate, under the provisions of the fourth specification of the first section, made to the supreme judicial court, shall be accompanied by a certificate from the judge of probate of the county where such estate was inventoried, showing the value of the real and personal estate of the deceased or ward, and the amount of his just debts or legacies, if the case require it; and also the opinion of such judge of probate, whether it is necessary that the whole or a part of the estate should be sold, and if part only, what part; and in all applications before said court, by guardians of minors under the fifth specification aforesaid, a certificate must likewise be produced from the judge of probate in the county where such minor's estate was inventoried, stating that in his opinion it would be for the interest of such minor, that the whole or a part of said estate should be sold for the purpose specified, and if part only, what part.

Sec. 9. Any court, hereby authorized to grant licenses, may examine, under oath, the petitioner or any other persons, whether interested or not, touching the truth of the facts set forth in the petition.

Sec. 10. No license to sell the estate of any ward, not a minor or insane, shall be granted, unless the applicant produces to the court a certificate under the hands of the overseers of the poor of the town where the ward resides, if in this state, giving their consent to the sale, and their opinion as to the amount proper to be raised thereby, excluding debts contracted by gaming; and if applicable to the case, whether it is necessary to sell a greater amount in value of land to prevent injury to the residue.

#### PRIVATE SALES AND SALES ON OFFER.

Revised Statutes of 1871, Chapter 71.

Sec. 11. In all cases where the courts may license a person to sell real estate at auction, they may license him to sell

from time to time at private sale, or to accept any advantageous offer for such estate or any part of it, and convey the same accordingly, if it appears to be for the interest of all concerned; but when so licensed, he may sell at auction, by complying with all the requisitions of law for sales at auction, and with any particular conditions of his license; and he shall be sworn and give bond as if he was licensed to sell at auction; and the court shall decide what notice, if any, shall be given of such sale, and if any is required, it shall be inserted in the license and given accordingly.

#### SALES BY GUARDIANS AND WIVES OF INCAPACITATED WARDS.

Revised Statutes of 1871, Chapter 71.

Sec. 12. When the guardian of an incapacitated person is duly licensed to sell the interest of his ward in any estate, held by him in right of his wife, she may, for a sufficient consideration, join with the guardian in the deed thereof, and it shall be as effectual as if made with her husband when under no disability; and when licensed to sell the real estate of his ward, she may release her right of dower therein to the purchaser, by a deed duly executed solely or jointly with the guardian, and she shall thus be forever barred of dower in the premises.

Sec. 13. The guardian, with the consent of the judge of probate to whom he accounts, may agree in writing with such wife how to invest, or otherwise dispose of a part of the proceeds of the sale of the whole estate for her sole use, equivalent to her interest therein; and the supreme judicial court may enforce such agreement in equity, as a trust.

#### SALES OF NON-RESIDENT ESTATES.

Revised Statutes of 1871, Chapter 71.

Sec. 14. The supreme judicial court and the probate courts may grant licenses to continue in force for three years, to executors and administrators of persons deceased out of the state, guardians of wards living out of the state, or some

other suitable persons on their petition, to sell and convey real estate or interest therein in this state, as if such deceased persons had died, and such wards lived in this state, and such executors, administrators, or guardians, had been here appointed; and all proceedings in such cases, before any probate court, shall be had before the judge of probate for the county where the real estate or any part thereof lies, and the bond required shall be given to him.

Sec. 15. A certified copy of the appointment of such executor, administrator, or guardian, by any court of probate having jurisdiction in any other of the United States, examined and allowed by any judge of probate in this state, and filed and recorded in his county, shall be sufficient proof of appointment to entitle him to the benefit of the preceding section.

LICENSES TO CARRY INTO EFFECT CONTRACTS OF DECEASED PERSONS.

Revised Statutes of 1871, Chapter 71.

Sec. 16. When it appears to the judge of probate having jurisdiction, that any deceased person in his lifetime made a legal contract to convey real estate and was prevented by death from so doing, and that the person contracted with or petitioner has performed or is ready to perform the conditions required by the terms thereof, he may on the petition of such person, his heirs, assigns, or legal representatives, authorize the executor or administrator, or special administrator of the deceased, or, when there is no executor or administrator, the guardian of the heirs of the deceased, to execute deeds to carry said contract into effect; and when such conveyance is made to an executor or administrator, he shall stand seized of such estate to the same uses as in case of real estate set off to him on execution.

Sec. 17. Before granting such authority, the judge shall cause due notice to be given to the heirs and all other parties interested, and require the person authorized to make convey-



ance, to give bond with sufficient sureties to account for whatever he receives therefor.

#### GENERAL PROVISIONS.

Revised Statutes of 1871, Chapter 71.

Sec. 18. No license granted under this chapter, except when otherwise provided, shall remain in force more than one year from its date; but when that time has expired, a new license may be granted, with or without new notice, at the discretion of the judge, for the sale of all or part of the same real estate, on filing a new bond.

Sec. 19. Any sale, duly appointed and notified, may be adjourned for a time or times within the time prescribed by the license, not exceeding fourteen days in all, at the discretion of the person licensed, by giving such reasonable notice thereof as circumstances will permit.

Sec. 20. When the real estate, for the sale of which license is necessary, lies in two or more counties, the supreme judicial or probate court, in either of said counties, may grant licenses for the sale of the whole, or any part thereof, in any other county in the state.

Sec. 21. Any court, granting license to sell real estate for the payment of debts, legacies, or expenses of administration, may prescribe therein what particular portions thereof shall be sold, and in what order, according to the last will of the testator or the principles of equity.

Sec. 22. Lands, of which the deceased died seized in fee simple or fee tail, general or special, and all that he had fraudulently conveyed, or of which he was colorably disseized to defraud creditors, are liable to sale for the payment of debts, under any license granted under this chapter; and any deed, executed and recorded in due form of law, for adequate consideration, in pursuance of any such license, shall be effectual to pass to the purchaser all the estate, right, title, and interest in the granted premises, which the deceased, the ward, or other person on whose account the license was

granted, might convey by a like deed if living and not incapacitated.

Sec. 23. In all cases of the sale of real estate, or any part, or interest therein, by virtue of licenses granted under any of the provisions of this chapter, the surplus proceeds of sale, remaining on the final settlement of the accounts of such proceeds, shall be considered as real estate, and distributed among the same persons and in the same proportions as the real estate would be by law.

Sec. 24. All who are heirs apparent or presumptive of the ward, shall be considered as interested in the estate, and may appear and answer to the petition of any guardian or other person for the sale of his estate; and when personal notice is required to be given, they shall be notified.

Sec. 25. When the granting of any license is contested, if it appears that the petition or objection to it is unreasonable, the court may award costs to the prevailing party.

Sec. 26. The affidavit of any person licensed as aforesaid, or of any person employed by him, made within eighteen months after the sale, and filed in the probate office, with one of the original advertisements of the time, place, and estate to be sold, or with a copy of such advertisement, and recorded, shall be sufficient proof that such notice was given; and a copy of such affidavit, certified by the register of probate, shall be competent evidence thereof.

Sec. 27. When any person, licensed as aforesaid, has duly taken the oath required by law, but no certificate thereof has been retained as provided in the preceding sections, parol evidence may be received that such oath was administered, in the trial of any action respecting the estate so sold; and if proved, it shall have the same effect as if a certificate thereof had been returned, filed and recorded.

Sec. 28. If any person, interested in any estate sold as aforesaid, suffers damage by the neglect or misconduct of the executor, administrator, or guardian, in such proceedings, he may recover a compensation therefor in a suit on the probate bond or otherwise, as the case may require.

## ACTIONS TO TRY THE TITLE OF LANDS SOLD BY LICENSE.

Revised Statutes of 1871, Chapter 71.

Sec. 29. No action shall be brought to recover any estate sold under this chapter, nor entry made thereon, except by judgment of law, with a view to avoid the sale by persons claiming under the deceased, or by the ward or persons claiming under him, unless it is done within five years after the sale, or the termination of the guardianship, except that persons out of the state, or under any legal disability at said times, are limited to five years after their return to the state, or the removal of the disability.

Sec. 30. In any action brought to contest the validity of any such sale, by the heir or others claiming under the deceased; the wife, or her heirs, in case of a sale of her estate by her husband; or the ward or persons claiming under him, no such sale shall be avoided on account of any irregularity in the proceeding, if it appears:

*First*—That the license was granted by a court of competent jurisdiction, and the deed duly executed and recorded.

*Second*—That the person licensed took the oath, and gave the bond and notice of the time and place of sale required by law.

*Third*—That the premises were sold in such manner, and within such time as the license authorized, and are held by one who purchased them in good faith.

Sec. 31. If the validity of such sale is contested by one claiming adversely to the title of the wife, ward, or deceased aforesaid, or by a title not derived through either, the sale shall not be held void on account of any irregularity in the proceedings, if it appears that the license was granted by a court of competent jurisdiction, and the deed duly executed and recorded.

## MISCHIEVOUS DOGS.

Revised Statutes of 1871, Chapter 30.

Sec. 1. Towns may pass by-laws to regulate the going at large of dogs within them. When any dog does any damage



to a person or his property, his owner or keeper, and also the parent, guardian, master, or mistress, of any minor or servant, who owns or keeps such dog, shall forfeit to the injured person double the amount of the damage done; to be recovered by action of trespass.

Sec. 2. Any person may lawfully kill a dog, that suddenly assaults him or any other person when peaceably walking or riding, or is found worrying, wounding, or killing any domestic animals out of the enclosure or immediate care of the owner.

Sec. 3. Whoever is assaulted, or finds a dog strolling out of the enclosure or immediate care of his master, may, within forty-eight hours thereafter, make oath before a justice of the peace that he really suspects such dog to be dangerous or mischievous, and notify his master by giving him a copy of said oath, signed by the justice; and if the master neglects for twenty-four hours thereafter, to confine or kill such dog, he shall forfeit five dollars to any person suing therefor; and if such dog is again at large out of the care of the master, any person may lawfully kill him.

Sec. 4. If a dog, after notice given as aforesaid, wounds any person by a sudden assault as aforesaid, or wounds or kills any domestic animals, the owner or keeper shall be liable to pay the person injured treble damages and costs.

#### LAW OF THE ROAD.

Revised Statutes of 1871, Chapter 19.

Sec. 1. As used in this chapter the word "way" includes all kinds of public ways. And the word "team" all kinds of conveyances on such ways for persons and for property.

Sec. 2. When persons traveling with a team are approaching to meet on a way, they are seasonably to turn to the right of the middle of the traveled part of it, so far that they can pass each other without interference. When it is not safe, or is difficult on account of weight of load to do so, a person about to be met or overtaken, if requested, is to stop a rea-

sonable time, at a convenient place, to enable the other to pass.

Sec. 3. When a person with a team is stationary, or traveling slowly on a way at a place unsafe or inconvenient for passing him with a team, he is, if requested, to drive to the right or left, or to stop a reasonable time at a convenient place, to allow the other to pass.

Sec. 4. No person is to leave his team stationary on a way so as to obstruct the free passage of other teams; or is to allow his team to be on a way without a driver.

Sec. 5. Three or more bells are to be fastened to one of the foremost horses drawing teams on snow without wheels.

Sec. 6. Any person injured by a violation of any provision of the previous sections, may recover damages in an action on the case, commenced within one year. Any person found guilty of such a violation forfeits not less than one, nor more than twenty dollars, to be recovered on complaint made to a trial justice within sixty days.

Sec. 7. No team is permitted to travel faster than a walk on a bridge erected wholly or partly by the state, nor on any bridge covered with plank and fifty feet long composing part of a way, nor on any bridge owned by a corporation, if a board with the words "three dollars fine for riding or driving on this bridge faster than a walk," legibly painted in black letters on a white ground, is kept exposed in some conspicuous place at each end thereof.

Sec. 8. For a willful violation of the provisions of the preceding section, a person forfeits three dollars to be recovered on complaint to the use of the owners of the bridge, or the town required to keep it in repair, with the costs of prosecution; but no person passing after sunset and before sunrise is liable to such forfeiture without proof that he previously had knowledge of such prohibition.

Sec. 9. The driver of a team having passengers therein conveyed for hire, who leaves it without any person in charge of it and without fastening it securely, may be punished by

fine not exceeding thirty dollars or by imprisonment not exceeding one month.

Sec. 10. Teams with wheels, when drawn by more than two horses or oxen, must have the rims of their wheels at least four inches wide, when drawn by more [than four] horses or oxen at least five inches wide, when traveling on the Mattanawcook road from Milford to Lincoln village; the military road from there to Houlton; Aroostook road from the military road to Aroostook river; Fish river road from that to Fort Kent; and the road from Guilford village to Moosehead lake. And no team drawn by more than six horses or oxen is allowed to travel on them. These provisions are not applicable to stage or pleasure carriages, or to those owned by the state or the United States, or to any cart or wagon owned by settlers in the vicinity and used for farming purposes. The owner or driver of a team violating this provision forfeits twenty dollars, and one dollar more for each mile of road passed, to be recovered by complaint before a trial justice in the county where the offence was committed; and on a libel or complaint he may issue his warrant to seize and detain such team to respond such fine and costs.

#### MALICIOUS MISCHIEFS AND TRESPASSES ON PROPERTY.

Revised Statutes of 1871, Chapter 127.

Sec. 1. Whoever willfully or maliciously kills, wounds, maims, disfigures, or poisons any domestic animal, or exposes any poisonous substance with intent that the life of any such animal should be destroyed thereby, shall be punished by imprisonment not more than four years, or by fine not exceeding five hundred dollars.

Sec. 2. Any person who unlawfully, willfully, and with intent to injure the owner, takes away any horse, saddled, or harnessed, or attached to any vehicle, and standing in any highway or other place, shall be punished therefor, by a fine not exceeding one hundred dollars, or imprisonment in the county jail not more than three months.



Sec. 3. Whoever in any other case, willfully and mischievously takes or uses any boat or vehicle, or takes, drives, rides, or uses any horse, ox, or other draft animal, the property of another, without the consent of the owner, or person having the legal custody, care and control of the same, shall be punished by fine not exceeding three hundred dollars, or by imprisonment for a term not exceeding one year; but this and the preceding section do not apply to any case of taking the property of another with intent to steal the same, nor when such property is taken under a claim of right, or with the presumed consent of the owner, or person having the legal control thereof.

Sec. 7. Whoever willfully and maliciously cuts down, destroys, or otherwise injures any shrub or tree for ornament or use; breaks, injures or defaces any fence; throws down or opens any gates or bars; injures, destroys, or severs from the land of another, any produce thereof or thing attached thereto, such articles not being his own, shall be punished by imprisonment less than one year, and by fine not exceeding one hundred dollars.

Sec. 9. Whoever willfully commits any trespass, or knowingly authorizes or employs another to do so, by entering the garden, orchard, pasture, cranberry ground, or improved land, of another, with intent to take, carry away, destroy, or injure the trees, shrubs, grain, grass, hay, fruit, vegetables, turf or soil thereon, shall be punished by a fine not exceeding twenty dollars, and imprisonment not more than thirty days.

Sec. 10. Whoever willfully enters and passes over any garden, yard or other improved field, after being expressly forbidden so to do by the owner or occupant thereof, shall be punished by fine not exceeding five dollars, or imprisonment not more than ten days.

Sec. 11. Whoever, at any time, enters any orchard, fruit garden, vineyard, or any field or enclosure, kept for the purpose of cultivating any domestic fruit therein, without the

consent of the owner or occupant thereof, and with the intent to take, injure, or destroy anything there growing; and whoever willfully cuts down, injures or destroys any tree, shrub, or vine, within any of the places before named, or injures any building, trellis, frame work, or any appurtenance belonging to or upon any of said places, shall be punished, on conviction thereof, by a fine of twenty dollars and costs, and imprisonment not less than thirty days, and in default of payment of said fine and costs, he shall be further imprisoned at the rate of two days for each dollar of said fine and costs. All fines imposed by this section, when collected, shall be paid to the overseers of the poor, for the use of the poor of the town where such conviction is had.

Sec. 12. The owner of any such place, or any person employed in the cultivation of, or rightfully in the possession thereof, may arrest any person found violating any of the provisions of the preceding section, and carry him before any magistrate having jurisdiction of the offence, within the county where the arrest is made.

#### AGRICULTURAL STATISTICS.

Revised Statutes of 1871, Chapter 3.

Sec. 32. The assessors of cities, towns and plantations, on or before the first day of July in each year, shall make return to the office of secretary of state, for the year ending on the first day of April next preceding, of the number of horses four years old and upwards, and cattle less than four years old, neat stock, sheep and swine, therein on said first day of April, the number of bushels of Indian corn, rye, barley, oats, beans, peas, buckwheat, potatoes, turnips, beets, carrots and apples, the number of tons of upland, bog, salt and intervale hay, the number of pounds of butter, cheese, honey, and maple sugar, the number of gallons of maple syrup and molasses, raised and made therein during the year, the number of wool skins disposed of, the value of poultry and eggs produced, and the number of sheep killed by wild animals and dogs during the year.

Sec. 33. The secretary of state shall cause to be printed blank tables conveniently arranged for the return of facts as aforesaid, and shall furnish three copies of the same, with a copy of the two preceding sections printed thereon, to the assessors of each city, town and plantation, on or before the twentieth of March in each year.

Sec. 34. The returns from the cities, towns and plantations in each county, as they are received at the office of the secretary of state, shall be filed by themselves in a convenient form for reference for the use of the legislature and for the secretary of the board of agriculture.

#### STATE COLLEGE OF AGRICULTURE AND THE MECHANIC ARTS.

Private and Special Laws of 1865, Chapter 532.

Sec. 1. Samuel F. Perley, N. T. Hill, Bradford Cummings, Thomas S. Lang, Dennis Moore, William D. Dana, S. L. Goodale, Robert Martin, Alfred S. Perkins, Joseph Farwell, Seward Dill, Joseph Day, Ebenezer Knowlton, Hannibal Hamlin, Charles A. Everett and William Wirt Virgin, are hereby constituted a body politic and corporate, by the name of the Trustees of the State College of Agriculture and the Mechanic Arts, having succession as hereinafter provided, with power to establish and maintain, subject to the provisions and limitations of this act, such a college as is authorized and provided for, by the act of the congress of the United States, passed on the second day of July, in the year eighteen hundred and sixty-two, entitled "an act donating lands to the several states and territories, which may provide colleges, for the benefit of agriculture and the mechanic arts." They shall be entitled to received from the state the income which shall accrue from the funds granted to the state by the act aforesaid, and shall apply the same, together with all such income as they shall receive from any other sources to the maintenance of the college in conformity with the act of congress.



Sec. 2. The trustees shall annually elect one of their number to be president of the board. They shall appoint a clerk and treasurer, both of whom shall be sworn, and shall hold their offices at the pleasure of the trustees. The clerk shall record all proceedings of the board, and copies of their records certified by him shall be evidence in all cases in which the originals might be used. The treasurer shall be required to give suitable bond, and to renew the same, whenever the trustees shall require.

Sec. 3. The governor and council shall at all times have power, by themselves, or such committee as they shall appoint to examine into the affairs of the college, and the doings of the trustees, and to inspect all their records and accounts, and the buildings and premises occupied by the college. Whenever the governor and council shall have reason to believe that the trustees are exercising or attempting to exercise any unlawful powers, or unlawfully omitting to perform any legal duty, they may direct the attorney general to institute process against the trustees in their corporate capacity, in the nature of a complaint in equity before the supreme judicial court, in the county in which the college may be established, and the court, after notice, shall hear and determine the same, by summary proceeding in term time, or by any judge in vacation, and may make any suitable decree, restraining the trustees from performing or continuing the unlawful acts complained of, for requiring them to perform whatever is unlawfully omitted, and may enforce such decrees. In like manner a complaint may be instituted against any individual trustee, and be heard in the county where he resides, alleging against him any cause deemed by the governor and council sufficient to disqualify him for the trust; and if in the judgment of the court such allegation shall be sustained, a decree shall be made removing such trustee from office, and his place shall be thereby vacated.

Sec. 4. No person shall be a trustee, who is not an inhabitant of this state, nor any one who has reached the age of seventy years. The clerk of the trustees shall give notice of

all vacancies to the governor and council; vacancies occurring in any of the foregoing modes, or by the resignation or decease of any trustee, shall be filled in the following manner: The first vacancy that shall occur, shall be filled by the legislature at the next session thereafter by joint ballot of the two branches; the second vacancy shall be filled by the trustees at their next meeting; and all succeeding vacancies shall be filled in like manner, alternately by the legislature and the trustees.

Sec. 5. The trustees, in their corporate capacity, may take and hold in addition to the income, which they shall receive, through the state from the endowment made by congress, such other real and personal property as may be granted or devised to them for the purpose of promoting the objects of this act. But they shall not be entitled to receive any benefactions made to them upon conditions inconsistent with the act of congress aforesaid, or for purposes different from what is therein prescribed.

Sec. 6. The governor and council shall take measures, as soon as may be advantageously done after the passage of this act, to sell the land scrip received by this state under the act of congress, and to invest the same as required by the fourth section of said act. The securities shall be kept by the state treasurer, and he shall report annually to the legislature the amount and condition of the investments, and of the income of the same. He shall from time to time, as the income shall accrue, pay over the same to the treasurer of the college.

Sec. 7. It shall be the duty of the trustees, as soon as may be, after their organization, to procure a tract of land suitable as a site for the establishment of the college. If no other provision shall be made therefor, there shall be placed at the disposal of the trustees for this purpose, such proportion as the governor and council may deem suitable, of that part of the fund, which is authorized by the fifth section of the act of congress to be expended for the purchase of lands for sites or experimental farms.

Sec. 8. The trustees shall appoint such directors, professors, lecturers and teachers in the college, and employ such other persons therein from time to time, as the means at their command may permit for the accomplishment of the objects enumerated and described in the fourth section of the act of congress. Every officer and every person employed shall hold his office or employment at the pleasure of the trustees. They shall, as soon as may be, arrange and make known the several courses of instruction which they will undertake at the outset of the college, and shall enlarge and improve the same whenever practicable, subject to the limitations prescribed by congress. They shall also establish the qualifications for admission, and modify the same, as circumstances may require. But no student shall be admitted into or continued in the college, nor shall any person be employed in any office or service, who is not of good moral character and pure life.

Sec. 9. In addition to the instruction which is to be given by classes, text books, lectures and apparatus, in such branches of learning as are related to agriculture and the mechanic arts, the trustees shall provide, as fully as may be for practical experiments and demonstrations of scientific principles and rules. They shall encourage, and for due proportions of time, at different seasons of the year, and with reference to other exercises, require all the students to engage in actual labor upon the lands and in the workshops with which the college may be furnished, and shall provide suitable oversight and direction in such labor, so that they may become habituated to skilful and productive industry.

Sec. 10. Military tactics shall be taught, during some suitable part of each year, to all the students; and they shall be required to form and maintain such habits of obedience and subordination, as may be useful to them, if called into military service. The adjutant general shall be authorized to furnish to the college, for military drill, such arms and equipments, not needed by the state for other service, as may



suffice for the number of students. He shall also furnish to the college a United States flag.

Sec. 11. Such other studies are to be taught, within the limitations of the act of congress, as the facilities of the college, and the periods of instruction will permit.

Sec. 12. Students who satisfactorily complete any one or more of the prescribed courses of study, may receive public testimonials thereof, under the direction of the trustees, stating their proficiency.

Sec. 13. No charge shall be made for tuition, to any student who is an inhabitant of this state; and the trustees and all persons employed by them shall constantly endeavor, by the adoption of judicious and effective arrangements in all the labor departments of the college, to reduce the cost of subsistence to the students, and to render the institution, as far as possible, self-sustaining.

Sec. 14. It shall be the duty of the trustees, directors and teachers of the college, to impress on the minds of the students, the principles of morality and justice and a sacred regard to truth; love to their country; humanity and universal benevolence; sobriety, industry and frugality, chastity, moderation and temperance, and all other virtues which are the ornaments of human society; and among other means to promote these ends, and to secure the best personal improvement of the students, the trustees shall provide, as fully as may be practicable, that the internal organization of the college shall be on the plan of one or more well regulated households and families, so that the students may be brought into relations of domestic intimacy and confidence with their teachers.

Sec. 15. If at any time, the number of students, applying for admission shall be greater than the means of the trustees will enable them to receive, they shall make regulations for the number to be admitted, having reference to the proportions of population in the several senatorial districts in the state, and equalize the admissions according to such proportions as nearly as may be.

Sec. 16. The trustees shall hold a regular session at the college at least once in each year; and may provide for periodical visitations by committees. No trustee shall receive any compensation except actual travelling expenses to be paid from the treasury of the college.

Sec. 17. The treasurer of the college shall make as often as once in six months, a detailed report of all receipts and expenditures, and the trustees shall cause the same to be verified by full inspection and settlement of all his accounts, and shall transmit a copy of the same, as verified by them to the governor and council. The trustees shall also cause to be made annually, such report as is required by the fifth section of the act of congress, and communicate the same as therein provided.

Sec. 18. The legislature shall have the right to grant any further powers, to alter, limit or restrain any of the powers vested in the trustees of the college established by this act, as shall be judged necessary to promote the best interests thereof. And this act shall take effect upon its approval by the governor.

Private and Special Laws of 1866, Chapter 59.

The inhabitants of Orono are hereby authorized to raise money by taxation or loan, not exceeding eleven thousand dollars, for the purchase of the White farm and the Goddard or Frost farm, so called, in said Orono, and convey the same, or cause them to be conveyed, to the trustees of the Maine State College of Agricultural and Mechanic Arts; *provided* that the inhabitants of said Orono, at a legal meeting within thirty days from the approval of this act, by a vote of two thirds of their legal voters present and voting, shall agree thereto.

Private and Special Laws of 1866, Chapter 66.

The inhabitants of Oldtown are hereby authorized to raise money by taxation or loan, to aid in the purchase of land in Orono, for the use of the State College of Agriculture and Mechanic Arts, and to convey the same, or cause it to be

conveyed to the trustees of said college; *provided* that the inhabitants of said Oldtown, at a legal meeting, within thirty days from the approval of this act, by a vote of two thirds of their legal voters present and voting, shall agree thereto.

Resolves of 1870, Chapter 179.

*Resolved*, That the sum of twenty-two thousand dollars be, and is hereby appropriated, in aid of the College of Agriculture and Mechanic Arts, and that the sum of twenty-eight thousand dollars, appropriated by resolve of March twelfth, eighteen hundred and sixty-nine, not drawn or made use of by the college, be and is hereby reappropriated, and that chapter eighty-nine of the resolves of eighteen hundred and sixty-nine, be and is hereby repealed; *provided*, that before either of said sums is paid out of the treasury, there shall be vested in the state, a perfect title to the premises heretofore conveyed by the town of Orono, for the purposes of said college, the only condition of said conveyance being that if, at any time, the said land shall cease to be used for the purposes of said college, then the state shall pay to said town of Orono the sum of money heretofore expended by that town in the purchase of said premises, viz., eleven thousand dollars.

Public Laws of 1874, Chapter 194.

Sec. 1. All vacancies occurring in the board of trustees of the state college of agriculture and the mechanic arts shall be filled by the governor with the advice and consent of the council.

Sec. 2. All laws inconsistent with this act are hereby repealed.

Private and Special Laws of 1872, Chapter 147.

Sec. 1. Females who possess the suitable qualifications for admission to the several classes, may be admitted as students in the college; subject to the requirements of labor and study, which may be determined by the faculty of instruction and by the trustees of the college.

Sec. 2. This act shall take effect when approved.



## SALE OF MILK.

Public Laws of 1871, Chapter 217.

Section forty-six of chapter thirty-eight of the revised statutes, is hereby amended, by striking out the word "wine" in the third line of said section, and inserting the word 'milk,' so that said section as amended shall read :

'Sec. 46. All measures, cans, or other vessels used in the sale of milk, shall annually be sealed by the sealer of weights and measures by milk measure, and shall be marked by the sealer with figures indicating the quantity which they hold, and whoever fraudulently sells by any other measure, can or vessel, shall forfeit twenty dollars for each offence.'

Public Laws of 1872, Chapter 68.

Chapter two hundred and seventeen of the public laws of eighteen hundred and seventy-one, is hereby amended, by striking out the word "milk" in third and sixth lines, and inserting instead thereof in each place, the words 'ale and beer,' so that said chapter as amended will read as follows : Section forty-six of chapter thirty-eight of the revised statutes, is hereby amended by striking out the word "wine" in the third line of said section, and inserting the words 'ale and beer,' so that said section as amended shall read :

'Sect. 46. All measures, cans, or other vessels used in the sale of milk, shall annually be sealed by the sealer of weights and measures by ale and beer measure, and shall be marked by the sealer with figures indicating the quantity which they hold, and whoever fraudulently sells by any other measure, can or vessel, shall forfeit twenty dollars for each offence.'

## ENCOURAGEMENT OF THE GROWTH OF FOREST TREES.

Public Laws of 1872, Chapter 66.

That any landholder in this state who shall plant or set apart any cleared land or lands from which the primitive forest shall have been removed for the growth and production of forest

trees within ten years after the passage of this act, and shall successfully grow and cultivate the same for three years, the trees being not less in numbers than two thousand on each acre and well distributed over the same, then on application of the owner or occupant of such lands to the assessors of the town in which the same is situated and is so successfully cultivated or set apart to forest trees, and at the same time of such application shall file with said assessors a correct plat of such lands with description of their location, and setting forth all the facts in relation to the growth and cultivation of said grove of trees or incipient forest, the same shall be exempt from taxation for twenty years thereafter; *provided* such grove or plantation of trees shall during that period be kept alive and in a thriving condition.

#### FEES OF FENCE VIEWERS.

Public Laws of 1873, Chapter 129.

Chapter twenty-two, section thirty-nine of the revised statutes, be amended as follows: After the words "employing him at the rate of one dollar a day," insert 'at the rate of two dollars per day,' so that said section as amended shall read as follows:

'Each fence viewer shall be paid by the person employing him at the rate of two dollars per day for the time he is so employed. If the party liable neglects to pay the same for thirty days after demand, each of said fence viewers may recover double the amount in an action on the case, and be mutually witnesses for or against each other.'

#### ENCOURAGING THE MANUFACTURE OF BEET SUGAR.

Public Laws of 1877, Chapter 184.

The governor and council are hereby authorized, upon such terms and conditions as they shall deem advantageous to the state, to contract with any responsible party or company, to pay said party or company a sum not exceeding one cent per pound, on all beet sugar manufactured in this state, from beets raised in this state; the amount of bounty, so paid, not

to exceed seven thousand dollars in any one year, and not to exceed ten years from the time of the payment of the first bounty money.

#### WEIGHT OF BEANS.

Public Laws of 1878, Chapter 7.

Sec. 1. Section fifty-six of chapter thirty-eight of the revised statutes is hereby amended by striking out the words "sixty-four," after the word "beans," in the seventh line of said section, and inserting in place thereof the words 'sixty-two.'

Sec. 2. This act shall take effect when approved.

#### COMMERCIAL FERTILIZERS.

Public Laws of 1878, Chapter 17.

Sec. 1. Every package of fifty pounds or more of commercial manure or fertilizer sold, or kept for sale, at over one cent a pound, unless prepared essentially from fish and sold as such, shall be marked with its weight, the name and place of business of the manufacturer and seller, and with a true analysis of the chemical elements, and the several amounts of each contained therein.

Sec. 2. Any person guilty of a violation of section one shall be subjected to a penalty of one hundred dollars.

Sec. 3. The secretary of the state board of agriculture may procure the analysis of any fertilizer offered for sale within the state, and prosecute any person who shall violate the provisions of this act.

#### LAW OF THE ROAD.

Public Laws of 1878, Chapter 24.

Section ten of chapter nineteen of the revised statutes is hereby amended, by inserting after the word "oxen," wherever it occurs in said section, the word 'mules,' and by inserting after the word "lake," in the eighth line, the words 'and the road leading from Jackson brook, in Washington county, to Forest City,' so that said section, as amended, shall read as follows:



Sec. 10. Teams with wheels, when drawn by more than two horses, oxen or mules, must have the rims of their wheels at least four inches wide, when drawn by more than four horses, oxen or mules, at least five inches wide, when travelling on the Mattanawcook road from Milford to Lincoln village, the military road from there to Houlton; Aroostook road, from the military road to Aroostook river; Fish river road, from that river to Fort Kent; and the road from Guilford village to Moosehead lake; and the road from Jackson brook, in Washington county, to Forest City; and no team drawn by more than six horses, oxen or mules, is allowed to travel on them. These provisions are not applicable to stage or pleasure carriages, or to those owned by the state or the United States, or to any cart or wagon owned by the settlers in the vicinity and used for farming purposes. The owner or driver of a team violating this provision forfeits twenty dollars, and one dollar more for each mile of road passed, to be recovered by complaint before a trial justice in the county where the offence was committed, and on a libel or complaint he may issue his warrant to seize and detain such team to respond such fine and costs.'

## AGRICULTURAL EXPERIMENT STATIONS.

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During the past few years great interest has been developed in our own country concerning the practical benefit which science may render to agriculture, or the actual applications of scientific results to practical farm work. We have numerous agricultural colleges, at which students pursue studies which have a direct bearing upon all branches of practical agriculture; but there has seemed to be a desire to have the scientific results of the laboratory made more available to actual farm work. This end can be better gained, it is believed, through agricultural experiment stations, as they are carried on in England and on the Continent, than by any other agency. The benefit which these stations have conferred upon agricultural industry abroad, has led to the establishment of one in the State of Connecticut, and by a recent endowment the Agricultural College at Amherst, Mass., has also established such an one in connection with that institution. That of Connecticut, which was incorporated in 1875, is located at New Haven, and its work is of the most valuable and important kind in connection with agricultural progress in that State. It was founded "for the purpose of promoting agriculture by scientific investigation and experiment;" and its work is to analyze and test fertilizers, cattle-foods, seeds, soils, waters, and other agricultural materials and products, to identify grasses, weeds and useful or injurious insects, and to give information on the various subjects of agricultural science, for the use and advantage of all farmers of the State. It is sustained by an appropriation from the State, is under the control of a board of managers composed of prominent scientific and agricultural gentlemen, and has a competent working force of skilled chemists and experts. The results

of it its work have been of great value to agriculture, and by means of its analyses of commercial fertilizers, it has alone saved thousands upon thousands of dollars to the farmers of that State.

As indicating the methods of work employed by the experiment stations of Continental Europe—upon which those in this country are founded—and as giving a great deal of useful information upon the relations they sustain to practical agriculture, I present below a report upon the Agricultural Experiment Stations of Europe, prepared by Prof. Samuel W. Johnson, Director of the Connecticut Experiment Station, and published in the annual report of the Sheffield Scientific School for 1875 :

“Farming is a perpetual trying of experiments with soils, manure and crops, with cattle and cattle food, with milk, butter and cheese, with plows, harrows, and harvesters : with an almost endless list of things. The most successful farmers—those who get the most out of their land, their cattle, their crops, their fertilizers, their implements, and their labor—are those who experiment themselves most industriously, most skillfully, and most intelligently, and who take the fullest advantage of the experiments of others. The best agriculture is that which, in old countries, on worn and intractable soils, has learned by long-continued and varied experiment to make the gain of farming so sure, that capitalists as willingly loan money to invest in farm improvements as they put it into bank or railroad stock.

To take away from our agriculture what has been learned by toilsome and costly experiment would put us all back into the dark ages, for it would annihilate a thousand industries by cutting off supplies of the raw materials they work up ; it would stop our railway trains, and lay up our ships at the dock, for there would be no grain, no cotton, no fruits to transport. The country would stagnate for want of knowledge how to keep its men and women employed ; the land would grow up to weeds and woods for want of implements



to till it, and for want of seeds to plant. A few winters would starve our cattle, a few years would bring famine to ourselves. The cities, which have their roots in the country, would be paralyzed in every industry, in all their traffic, in all their commerce. The North would be depopulated by starvation or by emigration to snowless and frostless latitudes, and only a few hunters in winter, or herdsmen in summer, would break the solitudes of a New England desolation.

Our wealth, our enterprise, our intelligence, and our very virtue depend in large degree upon our agriculture; and our agriculture is the result of experience, and therefore depends mainly upon experiment. Agricultural experiment then, it cannot be denied, is an exceedingly weighty matter.

But, as agriculture has grown in the past from small beginnings and by slow degrees, until it has subdued the forests and dried up the morasses of nearly all Europe, and much of North America, and has raised our savage and plundering German and Anglo-Saxon ancestry to such habit of doing and having that their posterity, by sheer inheritance of character and possessions, now comprise the foremost nations of the world,—so agriculture must go on to grow, winning more acreage from forest and swamp, building more railroads and steamships, more cities and manufactories, and employing an ever-increasing force of men and women, horses, water-wheels, and engines to do its traffic, turn its useful raw products into more useful fabrics and foods, or to supply its incessant demand for more tools, machines and fertilizers.

Our soil is a mine of infinitely more riches than all the gold veins or placers of California and Colorado. Out of it the farmer digs our food and our clothes, and that mainly sums up the wealth of most of us. This riches of the soil may be easily squandered, and much of it now is from mere ignorance as good as thrown away. It may be restored also. Unlike metallic ore, which once dug out and skillfully smelted is forever worthless, the soil has a productive power of unlimited duration. The agencies that made soil from rock in the ages past, are perpetually at work making new soil from the rock

of to-day, as well as developing new fertility in the ancient soil. Man "by searching" has found out various means to accelerate and intensify this restoration and elaboration of fertility, and that people among whom the quest of better, cheaper, and more energetic means of heightening the productive power of the soil, and of best economizing that already at disposal, has been most successfully prosecuted, is the people that will lead in the march of civilization, and will impress its language, its manners, and its morals on the world.

Our agriculture has two very prominent wants. The one is a more universal acquaintance with and practice of what has already been learned, and the other is the learning of many things now unknown, which we feel important to understand—the settlement of much discussed questions that vex and baffle us in laying our plans, and embarrass our practice—the discovery of new facts that shall enlarge and improve our systems of farming. Every farmer remembers that his successes have been reached by a series of discoveries on his part. He can remember when he followed this and that practice, which he has come to see are defective and injurious, and therefore has abandoned—that he was once ignorant of most useful operations, resources, and methods, which, one by one have been revealed to him, either by conversation, reading, visiting some neighbor, near or remote, or by reflection and observation on his own premises.

Every New England farmer who maintains or increases the productiveness of his land under the changed circumstances of recent years, has done it by using knowledge which his forefathers did not possess or did not use, and no such farmer would willingly part with the knowledge thus gained. He would not part with it because there is advantage in it, money in it. He would not part with it because it has been a pleasure to acquire, and is a pleasure to possess and to communicate, and because he feels that he himself has grown and ripened by the gain of this knowledge. It has become a part



of himself, and in its assimilation he has become richer and stronger, and is happy in a greater mastery over nature, as well as in a consciousness of being abreast of the time and its opportunities.

The successful farmer is also he who most keenly feels the need of more knowledge. He has had his eyes most widely opened to the defects and insufficiency of his farming. He appreciates most keenly, that, while the least cost of a crop or of an animal's keep amounts to a certain sum—whether corn and cow be good or bad—the profit lies mainly in every kernel of grain or drop of milk he can produce *as increase* above the ordinary yield. To get an increase becomes his unceasing endeavor. He tries this method and that, varies the tillage and the treatment of the crop, varies the rations, and increases the care of his cows, proving all things and holding fast to that which experiment shows to be good. But with his best efforts he feels that there are blanks in his knowledge that he cannot fill. He tries a practice most highly recommended, and can get no profit of it, then another, with like result, and often finds the gains of his successful trials fully offset by the costs and losses of his failures. He does not lose faith in this plan of getting knowledge, but he learns that he cannot carry out all his good ideas, cannot make all the trials he would like, and has to submit to uncertainty and disappointment. He is more sobered than inspirited by some of his ventures, and if he does not settle down in "the good old way," he inclines more thereto, and feels a more charitable sympathy for those who let their neighbors try experiments, and even for those who get on by saving and by "scrimping," rather than by learning.

Recent years have brought a marvelous increase of knowledge into the world of affairs, and have strangely intensified the search for knowledge, as well as multiplied and energized the means of discovery. The methods and the fruits of intellectual investigation, the systematic hunting down of things hidden from the common gaze, and the game thus captured, were what we call science. Science is the peculiar pride and



glory of our century, for, although its seeds struck root in the old centres of Hindoo, Egyptian, Greek, Roman, and Arabian civilization, it has grown, like the Century Plant, with wearisome slowness, until, almost in our time, it has shot out its flowering stem, and is now at once unfolding a myriad blossoms and hanging full of precious fruits.

Of these benefits agriculture has had a fair share, and the results are like the transformations of magic.

It is a little more than a century ago that the wagon, the plow, and the harrow were almost the only machines used in the field processes of agriculture, and these were of rude and inefficient construction. There were almost no other implements then known for making the labor of four-footed animals of avail in farming operations. Then seeds were sown, crops weeded and tilled, harvests gathered, grain threshed and dressed almost exclusively by hard human toil.

So fixed had become the habits of the farm through long centuries of unvaried drudgery, that when Jethro Tull invented his seed-drill and horse-hoeing implements he could hardly make way for them, even by showing that they withstood the crucial test of use. It took many years to bring horse-husbandry to the level of practice, and practice to the level of horse-husbandry. But to-day we prepare the ground, sow the seed, till the plant in all stages of its growth, cut, spread, and gather the harvest, lift it upon the wagon, and lift it again into the barn loft, thresh, winnow, and bag it all by machines impelled by horse power, and only requiring a little skilled guidance and some ordinary attendance for full success.

A quotation from Eliot's "Fifth Essay on Field Husbandry," published in 1754, well illustrates by what stages and influences the machines for utilizing horse power on the farm have been gradually simplified, perfected, and cheapened so as to admit of universal use. The quotation, for which I am indebted to Professor Brewer, is as follows:

"Mr. Tull's wheat drill is a wonderful invention, but being the first invented of that kind, no wonder if it be intricate,

as indeed it is, and consists of more Wheels and other Parts than there is really any Need of. This I was very sensible of all along, but knew not how to mend it. Therefore I applied myself to the Reverend Mr. *Clap*, President of *Yale* Colledge, and desired him, for the regard he had for the Publick and to me, that he would apply his mathematical Learning and mechanical Genius in that Affair; which he did to so good Purpose that this new modelled Drill can be made for the fourth Part of what Mr. *Tull's* will cost."

A century ago the hard labor of a man could cut, rake and bind, thresh and clean, at the rate of but seven bushels of wheat per day, and there was no other practicable way known of doing the greater part of this necessary work. Now, a day's work of a man, attending our improved machines, can harvest and prepare for market fifty bushels.

Half a century ago two men and five horses, working in the most approved manner of those days, could comfortably thresh and clean, and get away the straw of 108 bushels of wheat in one week, or eighteen bushels per day. Last year, in California, human labor, in attendance on a steam thresher and cleaner, could travel from farm to farm and dress and bag wheat at the average rate of 110 bushels per man per day, and in full work could finish 165 bushels per man per day. Such saving of precious time at the critical periods of planting and harvest, and such release of human energy from lower to higher uses, is the result of improvements in the mechanics of the farm.

Chemistry, but a hundred years old, as we might say, has escaped within twenty-five years from the apothecary shop and the dye-house, and gone to work in the fields without disguise. She has always worked there, but anciently did her good deeds for the farmer in a fairy dress, and remained altogether invisible to the common eye.

About the middle of the last century, a lighthouse, known as the Dunston Pillar, was built on the Lincoln Heath in Lincolnshire, England. It was erected to guide travelers over a trackless, barren waste, a very desert, almost in the heart of

England; and long it served its useful purpose. The pillar, no longer a lighthouse, now stands in the midst of a fertile and rich farming region, where all the land is in high cultivation. For twenty-five years no barren heath has been visible, even from its top. Superphosphate of lime, a chemical invention, first applied to land by the British chemist Murray, and brought to the notice of reading farmers by Baron Liebig, has been the chief means through which this great change was effected. Superphosphate over great stretches of English soil makes, or once made, the turnip crop. Turnips there support sheep, and with sheep the English farmer knows how to get rich on the poorest light lands.

Liebig, in 1840, called attention to the chemical composition of the guano of Peru. That very year a few casks were imported into England as an experiment. The next year 2,000 tons were brought, and in sixteen years its aggregated sales in Great Britain amounted to \$100,000,000. Now Britain, Germany, France, and our seaboard States cannot get enough of it.

Our State of Georgia is officially estimated to expend \$10,000,000 annually in the purchase of fertilizers, and single towns in this State lay out thirty to fifty thousand dollars for guano, phosphates, etc., besides using large quantities of home supplies.

Chemistry has taught agriculture how to utilize the refuse of slaughter houses, and fisheries; the bones, the flesh, the blood, which but a few years ago were a waste, a nuisance, and a peril to the public health. It has found vast mines of fossil phosphates in England, Canada, Norway, Spain, France, Germany, South Carolina, Russia, and, but a few weeks ago, in Austria: and has shown how they may be quickly and profitably converted into a precious fertilizer.

Chemistry, by discovering and accurately defining the food elements of vegetable growth, and by revealing their sources and realizing the means of making them cheaply available to the farmer, has triumphantly overcome one of the previously insuperable obstacles to the development of national wealth.



Agricultural exports impoverish and ultimately exhaust any soil. Only a few favored regions are regularly fertilized by the exceptional arrangements of nature. The Nile valley, in Egypt, is annually top-dressed with the richest and finest *debris* of the tropical jungles and forests of half Eastern Africa, poured over all her acres by a never-failing inundation, and with diligent irrigation is as fertile to-day as it was two thousand years ago.

But Italy, Germany, France, Britain, and the United States, have seen, or are seeing, the productiveness of thousands of their fields decline to a profitless minimum, until lands once beautiful with harvests are desolate and abandoned. But the artificial barrenness of exhaustion, like the natural barrenness of the heath, or the sand-down, yields to the touch of science; and in all the older countries I have named, the work of reclamation is in full progress, and barring some great calamity of politics or nature, we are confident that the producing power of their soil will never again be less than now, but will increase many fold in the future, until they become gardens in all their breadth and to the very hill tops.

Many pages might be occupied in recounting the gain which agriculture, like all our industries, has received at the hand of science. It is but a few years since agriculture has been taught in universities and in special agricultural schools, because it is but recently that there has been anything to teach beyond the routine of manual practice that can be learned on any well managed farm. But now the Professor of Agriculture, the Professor of Agricultural Chemistry, the Professor of Vegetable Physiology, of Animal Physiology, find superabundant occupation in acquiring, systematizing, and communicating the facts and truths that constitute agricultural science. If in this country their labors in communicating are not excessive, it is because of special circumstances which will soon be changed.

Much of the advantage which agriculture has derived from science has come to it in the same way that President Clap cheapened the seed drill, viz: "out of regard for the Publick."

It was thus that Lawyer Tull, travelling for his health among the vineyards of France, and reflecting on the methods and results of vine culture, conceived those ideas of horse-husbandry, which he afterwards became a landholder for the sake of reducing to practice.

It was thus that James Smith of Deanston, Scotland, a manufacturer intent on bettering the life of his workmen, and substituting wholesome gardening and cow-keeping for the guzzling of beer and other village immoralities, learned those lessons in the thorough drainage and subsoil-plowing of clay lands that have added millions to the wealth and resources of British farms.

It was thus that Theodore de Saussure, of Geneva, Humphrey Davy, of London, and Justus Liebig, of Giessen, initiated those studies in Agricultural Chemistry and Physiology, which have added, and are to add, other millions to the wealth and resources of Europe and this country.

The mowing machine was invented and brought almost to perfection on the glebe of an English parsonage, by an English clergyman, Rev. Patrick Bell. The cotton gin, which raised a barely useful plant to a sudden commercial and manufacturing pre-eminence, was the unrewarded gift of a New Haven school-master, Eli Whitney, to the country and the world.

Within a few years farmers, seeing the advantages to be derived from uniting the resources of science with those of practice, in a systematic attempt to improve the methods, operations, and results of agriculture, have begun the establishment of the so-called Agricultural Experiment Stations.

The object of these stations is to make a regular business of discovery for the use of farming. To this end, farmers have formed associations, contributed land, buildings, cattle, labor, money, and whatever seemed needful or desirable to prosecute this business. They have undertaken it as a means of making money, a means of saving money. They have wanted to know how to save and use manure, in order to make good crops cheaply; how to save and use cattle food in

order to get good beef, wool, and milk cheaply. Aware that accurate and full knowledge of these matters could only be obtained by accurate and numerous experiments, they determined to have the experiments. Feeling that on their own farms the work of experimenting was costly, interfered with the regular business of the place, could not be properly carried on for want of skilled hands, and could not be suitably laid out for want of skilled heads, they united together to bring all these requisites into one focus, so that instead of having to be content with the gratuitous and accidental drippings from the science of the universities and schools, they might have their own well-spring of information, under their own control, and for their own purposes, purely.

They recognized the fact that science had developed the use of many valuable instruments of discovery—the thermometer, the microscope, the balance—that chemical analysis and the art of chemical investigation, which had given to the world phosphorus, superphosphates, chloroform, petroleum photography, electroplating, and were to give chloral, the superb dyes of coal tar, and an endless list of benefactions, were veritable engines of progress—and they determined to make full avail of them. They saw, too, that the farm was the place where these might most effectually be put to doing farm work, and therefore, in the year 1852, a company of Saxon farmers, constituting the Leipzig Agricultural Society, opened the first *Farmer's Station for Agricultural Experiment*, at the little village of Mœckern, near the city of Leipzig. The society already owned there a small farm, with farm house, barns, and some improved stock and implements. They engaged Dr. Emil Wolff, a young scientist of promise, to take charge, and Mr. Baehr, the manager of the farm, was instructed to superintend all the practical detail of experiments. Two or three rooms were fitted up as a chemical laboratory, a small glass house was built for vegetation experiments, an assistant chemist was secured, and the Experiment Station was an accomplished fact.

This was not, indeed, the first association of farmers for



scientific investigations in behalf of agriculture, nor was it the first instance of science taking up her abode on the farm. Scotland had her "Agricultural Chemistry Association," that, established for a period of five years, began its operations in 1843, and in 1848 was practically merged in the "Highland and Agricultural Society."

France had, so far back as 1835, in the neighborhood of Strasburg, an experiment station on the farm of Boussingault, who was Professor of Rural Economy in the Conservatory of Arts, in Paris. Both in the laboratory at Paris, and on his estate of Bechelbronn, Boussingault has for forty years carried on a series of most valuable researches, whether considered from the point of view of practice or of science.

When, in answer to the menace of Napoleon, the battalions of Germany swarmed over the fields of Alsace, it was well understood by Bismarck and Moltke that Jean Baptiste Boussingault was not merely a Frenchman, but was also a citizen of the world, a benefactor of every Prussian, Saxon and Bavarian landlord and peasant, and one who held highest rank and had done longest service among the priests and interpreters of nature. Bechelbronn was to them as holy ground, and was sacredly guarded from all molestation.

But Mœckern was the first station where farmers themselves brought science to their own farm to aid them in their own farming. The example there given was so brilliant and solid that within two years another Saxon society, in the town of Chemnitz, set up a second station, and of the twenty-two years that have since elapsed, 1867 is the only one which has failed to witness the founding of one or more similar institutions in Germany or the neighboring countries. The experiment station shortly came to be regarded not as a costly embellishment, or an agricultural luxury, in which universities or wealthy gentlemen might harmlessly indulge, but as a most remunerative and most necessary agency for the use as well as for the education of farmers.

The rate at which the idea of the agricultural experiment station fructified in continental Europe may be gathered from

the following statement of the number of stations in existence there at the expiration of each period of five years that has passed since the establishment of the station at Mœckern: In 1852, one; in 1857, eleven; in 1862, nineteen; in 1867, thirty; in 1872, sixty-two; in 1875, seventy. There are thus seventy of these experiment stations in Europe, each employing from one to five investigators, trained in the great modern schools of chemistry and physiology.

Some thirteen of these stations are chiefly devoted to the study of cattle feeding, as at Weende, Proskau, and Milan; some twenty-five to experiments on the conditions of vegetable growth, and the action of manures, as at Dahme, and Ida-Marienhütte; some to tobacco and grape culture, as at Carlsruhe; some to grape culture and wine making, as at Wiesbaden and Padua. The station at Udine is devoted to studies in silk production; those at Stockholm and Lodi to milk industry. Thirty stations are largely occupied with analyses of commercial manures. Eighteen stations test the purity and vitality of seeds. Most of the stations, however, combine several of these objects in their operations.

During the years 1852 to 1857 the Mœckern station published five reports of the experiments and researches there conducted, making together a most valuable volume of 574 octavo pages. Many others of the German, Austrian and Italian stations have issued similar reports in pamphlet or book form.

In 1859 began the publication, in Germany, of a special organ of the workers in what had thus grown to be a national enterprise. This journal, entitled *Versuchs-Stationen*, issued in bi-monthly parts, continues to this day. For the first years of its existence it formed a closely printed annual volume of 240 to 360 pages. In 1864 it thickened to nearly 500 pages, and still maintains that dimensions.

In 1863 the number of chemists and investigators connected with the experiment stations and agricultural schools had become sufficient to warrant an annual convention for discussion and exchange of views, and for ten years this general con-

ference of the agricultural explorers of Germany has been only once interrupted, and that by nothing less than the great war of 1866.

Previous to 1870 Italy had no institutions of this kind. In that year a commissioner was sent by the government to inquire into the workings of the German experiment stations. His favorable report led to their immediate establishment, and four were at once organized; nine were in operation in 1873, and now thirteen are in working order.

In the summer of 1874 an International Agricultural Exhibition was held at the great German port of Bremen. Of this exhibition the 10th section was exclusively devoted to the experiment station. Thirteen experiment stations and Agricultural Colleges were represented, and a very fair display was made of the various instruments, apparatus and arrangements employed in the stations for the scientific study of agriculture, as well as printed reports and tables, drawings, and diagrams illustrative of the methods and results of investigation. The experiment stations having unitedly declined to receive a money premium, had conferred on them the grand prize of honor of the Senate of the city of Bremen.

But what have the experiment stations accomplished? The farmer's work consists first in converting soil and manures into crops; second, in converting crops into beef, mutton, pork, milk, wool, labor and manure. In Europe the farmer often manufactures some of his crops into starch, sugar, wine, alcohol, &c.

The very earliest investigations in the Mœckern station were upon "The feeding of sheep to ascertain the best 'sustaining rations,'" i. e., the best combination of food for simply maintaining the weight and condition of a mature sheep, and upon "The dependency of plants on the atmosphere, and on mineral salts and salts of ammonia." These fundamental questions of agricultural science had been much discussed in the universities, and much was known about them, but they were far from a satisfactory solution. On the farms, too, there prevailed the greatest diversity of



opinion as to what constituted a sustaining ration for any given animal, and also as to the extent to which crops depend upon the atmosphere.

Without stopping now to review the state of agricultural doctrine and practice, as it was twenty-five years ago in Germany, or to trace in detail the steps of progress since traversed, I will state briefly some of the substantial advantages that have been gained as the immediate outcome of the efforts of the experiment stations.

1st. In respect to the food of plants, it has been settled that potash, lime, magnesia, iron, phosphoric acid, and sulphuric acid must be furnished to all agricultural plants through their roots and by the soil, in order to their growth. It has also been shown that soda, silica, and chlorine are not needful for the early growth of grain crops, but that chlorine is essential for the perfection of the seed, and that silica is probably necessary to uniform blossoming and ripening. It is further proved that water must enter crops through their roots; that carbon, which constitutes more than half their weight, is superabundantly furnished by air; that air and water together yield the materials out of which fully ninety to ninety-eight per cent. of crops is built up; and that the soil has to give for their nourishment but the two to eight per cent. of mineral matters which remain as ashes when they are burned, and the one-half to two per cent. of nitrogen which they also contain. It is likewise definitely settled that nitrates in the soil are the chief natural source of nitrogen, while the ammonia of manures, as well as a variety of substances containing nitrogen, and found in urine or formed in the decay of dead animals, likewise supply vegetation with nitrogen.

The experiment stations have further ascertained, by a multitude of trials, what quantities and proportions of all these elements are needful to produce any given crop, and to what extent they are removed from the soil. On the other hand, it has been determined what kinds of plant food, and what quantities, are contained in the long list of manures and

fertilizers, in all kinds of dung, urine, ashes, salts, guanos, phosphates, manufacturing refuse, etc., etc. The remarkable quality of the soil to sift, as it were, some of the most valuable, because most costly fertilizing elements out of manures, retaining them in a form not easily or not largely removed by rain, and yet accessible to the roots of plants—the so-called absorbent or fixing power of soils—has also been elaborately studied. We have thus a pretty complete knowledge of what a crop requires for its growth, what it carries off from the land, what is returned in straw or tops, and where we may look for the most effectual and cheapest restoration of the materials thus removed. The well-instructed farmer is thereby put in possession of the data for keeping accounts between his soil and his crops, so that he can estimate with accuracy what the soil itself can be relied upon to contribute yearly towards their production, and what must be supplied yearly or during each rotation, by means of manures, in order to maintain, to develop, or to increase the fertility of the land.

Dr. Wolff, who conducted the scientific work in the Mœckern station at its beginning, is the author of a valuable series of tables, which are published in a Farmers' Almanac, in Germany, and are largely employed in this kind of reckoning. One of these tables gives the quantities of water, nitrogen, potash, lime, phosphoric acid, etc., in 1,000 parts of all the plants and parts of plants which are encountered in German agriculture, including fifteen kinds of hay, twenty of green forage, nine of roots, eleven of leaves and tops of root crops, twenty-nine of meal, bran, oil cake and other manufactured products and by-products, sixteen sorts of straw, eleven varieties of chaff, twelve kinds of commercial plants, such as flax, hops, grapes, etc., fourteen of litter, like forest leaves, ferns, flags, sedge, etc., thirty-four varieties of grains and seeds, and seventeen kinds of animal matters, milk, cheese, blood, meat, wool, etc., making a total of 188 farm products.

Another table gives the composition, in 1,000 parts, of twenty-four varieties of stable and domestic manures, forty-

seven kinds of guanos and mineral fertilizers, ten sorts of superphosphates, designated by the material from which they are made, and twelve grades of potash salts.

A third table informs us what 1,000 pounds of barley and fifteen pounds of hops are separated into in the beer manufacture, how many pounds of spirits, grains, spent hops, etc., result, and how many pounds of water, nitrogen, potash, lime, phosphoric acid, etc., exist in each and all of these materials. This table also gives the corresponding products and their composition in case of the manufactures of yeast, of wheat flour, of cheese, of beet sugar, and of flax.

The experiment stations have, by their numerous exact trials, furnished us with rules for calculating from the rations of the animals the composition as well as the quantity of stable manure which is furnished by the different classes of live stock.

By aid of the facts thus made accessible to him, the German farmer can and does economize the resources of his soil, of his manure yard, and of the fertilizer market to a degree that was simply impossible twenty years ago. He can acquire as clear an idea of the state of his soil as to crop-producing capacity, as to what it needs and what it is already possessed of, as he has of his bank account. He can learn whether any course of cropping actually carried out in the past or proposed for the future has removed, or will remove, more or less potash, phosphoric acid, sulphuric acid, etc., from the field than the field has received in manures, or will be likely to yield without disturbing the equilibrium of its stores of plant food.

This cannot be done from these tables alone by any one who is merely able to read them or to reckon by rule of three, any more than the nautical almanac will enable the ship's cook to find latitude and longitude; but the tables give to the farmer who is moderately instructed in the now received doctrines of agriculture, in the matter of crop-production, the data for finding where he stands in relation to his soil and his crop, just as the tables for the latitude and longitude



serve the master of a vessel, who can identify a star and use a sextant to find his position at sea.

We labor here not only under the disadvantage which the educated German farmer has in a good degree overcome, by the use of the permanently valuable facts laid down in these tables, but we likewise suffer from the circumstance, that when we would try to sail by "dead reckoning," there is so much ignorant misrepresentation, or wilful fraud practised upon us in throwing the log or by hanging out false lights, that we are in continual uncertainty as to our course.

If we gather from the best consideration of the evidence at our hands that a field needs potash or nitrogen, or phosphoric acid, we find plenty of parties willing to sell us these things, but we also find that we cannot depend upon getting the worth of our money. Our markets are full of "superphosphates," "poudrettes," "tobacco-growers," "bone dust," "bone flour," "ground bone," of "bone meal," "pure," "best," "finest," "celebrated," "rotted," and "dissolved," of "meat scraps," "blood and bone fertilizers," "animal dust," &c., &c., some good, some bad, and in many cases the good appearing to be on the way to the bad. Many of our farmers have laid out their money for some of these things, and know that they were cheated by not getting what was promised, and what they supposed they were securing. Some have been bitten so badly that they purchase nothing, unless it is ashes, plaster, bone, fish scrap, or something which they can judge of by its looks. Some again, have purchased these very fertilizers whose value they believed they could estimate by inspection, only to learn when too late that they had been ingeniously deceived, and that the supposed "bone" contained twenty to fifty per cent. of water, oyster shells, plaster or nitre cake, which had no value for their farming.

The German farmers have had the same experience. It is just about twenty-five years since in Germany, as here, the trade in superphosphates, guano, and similar commercial fertilizers began. The same stupendous frauds by adulteration and dilution of good things were practiced there as they have

been, and, we have great reason to fear, still are carried on here. But the experiment station has perfectly cured and rooted out these evils in all the districts where it has been established and appreciated. The experiment station there is prepared to furnish the farmers at small cost with an analysis of any fertilizer he proposes to buy. The farmers avail themselves of this aid. They will buy no fertilizer without an exact statement of its composition, and they buy with the understanding that any deficiencies in the stipulated amount of fertilizing matters shall be made good or deducted from the payment. Under such circumstances, manufacturers can sell nothing that is not substantially what it claims to be. A further result of this system is, that low-grade fertilizers are little sought, and those makers who can supply the best article, of uniform quality and at the lowest rates, have the business. With large sales the dealers prosper, while the consumers are satisfied with their purchases, and instead of trying to see how they can get along with small use of purchased fertilizers, they are studying how to use the greatest quantities to advantage. The fertilizer market in Saxony and Prussia, where the experiment station has the universal sanction and confidence of the farmers, is just as settled and satisfactory as any branch of trade, and the farmers there buy superphosphate, guano, potash salts, etc., with as much security of fair dealing as we can feel in the purchase of sugar or nails.

In the second place, the vast interests represented in the feeding of cattle and other live stock have received an equal share of attention, and although the questions involved are in the highest degree complicated and abstruse, an encouraging measure of success in approaching their solution has been attained.

In our agricultural meetings and publications we are discussing the same old questions as to the value and economy of the various kinds of cattle food, and the methods of raising them, that have been discussed ever since there have been two ways open to the farmer for keeping his animals.



So long as we do not understand what hay, corn-fodder, corn-meal, oil-cake, bran, shorts, brewers' grains, etc., are in their distinct parts, and how their separate ingredients individually stand related to the wants of the living, growing, laboring, milk-giving, or fattening animal, so long we shall remain in a fog of discussion, so long we shall oppose each other in argument, in belief and in practice; so long, like men bewildered in the forest, we shall travel in a circle, and tire ourselves out without making progress forward.

In the tables which I have alluded to, in which a vast amount of the work of the experiment stations has been condensed to its results, in compact numerical statement, we find given the average quantities of water, albuminoids, carbohydrates, fat and cellulose, that are contained in 1,000 parts of each of some 200 kinds of forage and feeding stuff. Chemical analysis encounters extraordinary difficulties in its attempt to set forth the separate elements of food. Many of these difficulties are as yet but partially overcome, and many of our results are in some measure merely tentative and provisional; but a vast advance has been surely accomplished.

We can compare together hay and cornstalks, oats and corn-meal, peas and oil-cake, potatoes and turnips, by a comparison of their water, their albuminoids, their carbohydrates, their fat, and their fibre. We can also connect the preponderance of one or other class of ingredients with their observed use in cattle feeding.

The Experiment Stations have carried out a large number of feeding trials on oxen, cows, calves, horses, sheep, swine, and goats, taking account of the accurately weighed and analyzed food, not merely as so much hay, beets, etc., but also as so much water, fat, starch, gluten, etc.; and have thus given a new, more definite and more general expression to the results which practice had obtained.

As in the construction of a house, the builder must know not only the materials to be provided, but also the due proportions of them to be employed, so in the raising of a calf,



in the fattening of an ox, in the support of a draught horse or of a milch cow, the farmer should know, not merely that water, oil, albuminoids, etc., are absolutely required, but also demanded in such and such proportions. The nails and pins that are put into a house, beyond what are needed for binding the structure, are not only a waste of material in themselves, but may become a detriment to the building. So the want of due proportion among the elements of cattle food may be, and unquestionably is, in fact, an immense waste and damage to our agriculture.

In the Experiment Stations great numbers of practical trials have been carried out for the purpose of ascertaining the best quantities and proportions of the food-elements to use for the various purposes of the stock keeper, and the results that are now accepted as the best approximation to truth, are given in tables of so-called "Normal Rations."

These "Normal Rations" are confessedly approximate and imperfect; but they are based upon experiment, and they have an undeniable value. By their help the farmer can calculate the probably best combination of any sorts of cattle food that are at any time accessible to him. He can determine what to buy and what to sell to the best advantage of his cattle, his manure heap, and his cash on hand. And although the experimental foundation of these tables is not yet broad enough to support all the deductions that may be made from them, they have been useful in practice, and are invaluable as a safe basis for further inquiries.

The builder, in making his estimates of the materials needed to construct a house, allows, in case of lumber, a large percentage for loss by defects and unavoidable waste in cutting. He also provides for small waste of nails, while most of the other hardware required is expected to "hold out." The waste portions of cattle food must in like manner enter into the farmer's estimates. He must know to what degree the animal can build into its structure or otherwise make profitable use of the elements of all varieties of feeding stuff.

From this point of view, another class of investigations has

been actively prosecuted for some ten years as to the digestibility of different foods; not with reference simply to what proportion of hay or potatoes or cotton-seed meal is dissolved and consumed in gross, but what proportions of the fat, of the starch, of the albuminoids, of the fibre, of the phosphates, etc., are utilized as nutriment. These investigations are made by feeding known quantities of analyzed food, keeping account of gain or loss of live weight, and also collecting, weighing and analyzing the urine and dung. What enters the animal as food, that cannot be found again unaltered in the excrement, has been digested.

The digestibility of a given cattle-food is not invariable, but changes according to the kind of animal, and the articles that accompany it in the ration; but by numerous experiments it is expected that a series of average figures will be obtained which will serve usefully as a basis for estimating the relative values of different feeding stuffs.

One of the interesting results of these researches is, that the fibre or cellulose—the very wood—of plants is to a considerable degree digestible. It has “always” been known that the beaver subsists on wood and bark during winter, that cattle derive great satisfaction from browse, and that goats will eat newspapers and cotton cloth. Exact trials have shown that sheep are able to digest a large proportion of sawdust and of pure paper pulp, and that all farm animals readily convert into food from 40 to 70 per cent. of the fibre or woody matter of hay, straw and chaff. In fact, these materials have been proved to be not simply digestible “on a pinch,” but really serviceable to a corresponding degree with starch, sugar, oil, etc. Accordingly, in most of the well compounded cattle rations, the second rank in respect to quantity is occupied by cellulose or “crude fibre.”

It is remarkable how differently the same elements of various kinds of forage submit to digestive action, as exhibited in the following results of this class of experiments:



*Percentage of organic matter digested.*

	No. of Experiments.	Total Organic Substance.	Albuminoids.	Fat.	Fibre.
Meadow hay, - - - - -	45	64	59	50	62
Clover hay, - - - - -	18	60	59	59	47
Clover, just before flower, - -	4	71	85	66	56
"  in full flower, - - -	2	64	69	61	50
"  past flower, - - -	2	58	59	44	39
Potatoes, - - - - -	13	90	66	53	27
Linseed cake, - - - - -	8	81	86	90	69
Cotton-seed cake (with hulls),	4	50	74	91	23
Oats, - - - - -	9	69	75	78	20
Rye straw, - - - - -	5	51	24	32	62

The above figures are simply averages of the results of trials made in most cases by different experimenters on different animals. In case of meadow and clover hay they are perhaps so numerous as to fairly establish the superiority of the former, by showing that although clover hay contains some four per cent. more albuminoids than grass hay, it gives no more of them to the support of animals, while its fibre is far less digestible. The influence of age on the digestibility of forage is strikingly seen in case of clover, the percentage value of which decreases rapidly during flowering and ripening. Potatoes and linseed cake are among the most concentrated and digestible of foods; and cotton-seed cake, when free from hulls, ranks but little inferior to linseed cake. It is observed that rye straw is food to the extent of one-half its weight; while of the grain of oats 30 per cent. is undigested. But the albuminoids of oats are thrice more nutritious than those of rye straw; and the cellulose of the straw is thrice as nutritious as that of the oats. The belief so prevalent in this country, that Indian corn is unsurpassed among the grains as a food, finds confirmation in these researches, its relative digestibility being higher than that of barley, as well as that of peas and beans. It is evident that experiments which promise to give us the data for comparing the digestibility of different foods, are of the utmost importance. By their aid the compounding of really normal rations



will become a matter of satisfactory certainty, and the economy of cattle food will be pushed to near its limits.

A third direction in which the Experiment Station is proving of direct service to the farmer is in the examination of seeds as regards their genuineness, purity, and germinative quality. It is but a very few years since attention was directed in Great Britain to the wholesale distribution of purposely adulterated seeds throughout that country, and stringent laws and severe penalties were enacted to protect the farmer.

There lately flourished in London, establishments where the business of "doctoring" turnip-seed was prosecuted on an extensive scale. Old and worthless seeds, or the seeds of inferior kinds of turnips, were killed and colored, and used to the estimated amount of 20,000 bushels annually for adulterating the seed of those varieties most sought for by farmers.

In London and on the continent hundreds of tons of the cheap yellow clover seed (*Medicago lupulina*) were and still are mixed in larger or smaller proportions with the red clover seed, and sold at the high price of the latter.

In 1868, three tons of so-called red clover seed were sold to farmers in the Saxon city of Chemnitz alone, of which two-thirds was yellow clover.

In Saxony light and inferior kinds of oats are extensively bought by seedsmen to adulterate the heavy and prized sorts.

The celebrated "Probstei rye" is annually produced to the extent of 2,800 to 3,400 bushels; but the amount ostensibly disposed of in the seed trade is hundreds of thousands of bushels.

Dr. Nobbe, Director of the Tharand Experiment Station, reports finding in a sample of tall meadow fescue grass (*Festuca elatior*) 70 per cent. of adulteration; and two samples of so-called "grass seed," having all the external appearance of a good article, were found to consist of grass flowers only, without a ripe seed of any sort.

The climax of this kind of ingenious villainy appears to have been reached in Hamburg, where there recently existed a manufactory of counterfeit clover seed, which was made from quartz sand, and with such skill as to deceive experienced judges, who have pronounced samples containing 25 per cent. of the quartz grains to be pure red clover seed.

In a sample of Timothy seed which had the appearance of being very pure, Dr. Nobbe found about 7 per cent. of foreign seeds, in which he identified 31 different kinds, mostly weeds and inferior grasses; and he calculated that upon a Saxon acre (= 1.37 Eng. acres) no less than 1,700,000 of foreign seeds would be sown, or 24 upon every square foot, by using the customary quantity of this pure Timothy seed.

Dr. Nobbe examined, during the first four years since the Tharand Experiment Station has given this matter attention, some 1,700 samples of seed. He determines not only the extent of adulteration with foreign seeds and mixtures, but he also ascertains, by careful sprouting trials, what percentage of the genuine seed is alive and capable of producing vigorous plants.

Dr. Nobbe has, by very numerous and laborious experiments upon seeds procured from various localities and climates, determined what must be regarded as the average per cent. of good seed that will sprout and grow, in a number of various kinds, when genuine. His experience shows that unadulterated white clover seed of which 66 per cent. will germinate, is of average quality; flaxseed of which but one-half will sprout is poor; while dill seed of which 10 per cent. comes up, is excellent.

Dr. Nobbe's experiments show further that very many genuine commercial seeds are of inferior quality, yielding much less than the proper average of plants, probably from admixture with the fresh stock, of old seed whose vitality is impaired or destroyed.

The many complaints that are made of the poor quality of the seeds sent out by the Agricultural Department at Wash-

ington, are in large degree explained by these revelations of the state of the trade in Europe.

It is but six or seven years since Dr. Nobbe first called public attention to this subject. He has begun the publication of a book containing full descriptions and figures of all the useful and hurtful seeds that occur in commerce; and already at some twenty experiment stations farmers are able to get trustworthy examinations of seeds as to purity and vitality, and at a trifling cost.

To say that the farmers of Connecticut and of our entire country urgently need the aid and stimulus of the Experiment Stations, is to make a most evident assertion. Our Agricultural Colleges have but few agricultural students. The Agricultural Course of Instruction in this school is a supply that meets little demand. The reason lies mainly in the fact that our intellectual activity has the habit of running in other than agricultural channels. To bring our farmers in direct and profitable contact with the results of science, to bring science into active and visible co-operation with the toils and plans of the farm, would redound to the eminent advantage of both. The experiment station, I cannot doubt, is to be this point of contact, the focus of this co-operation.





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