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1860.

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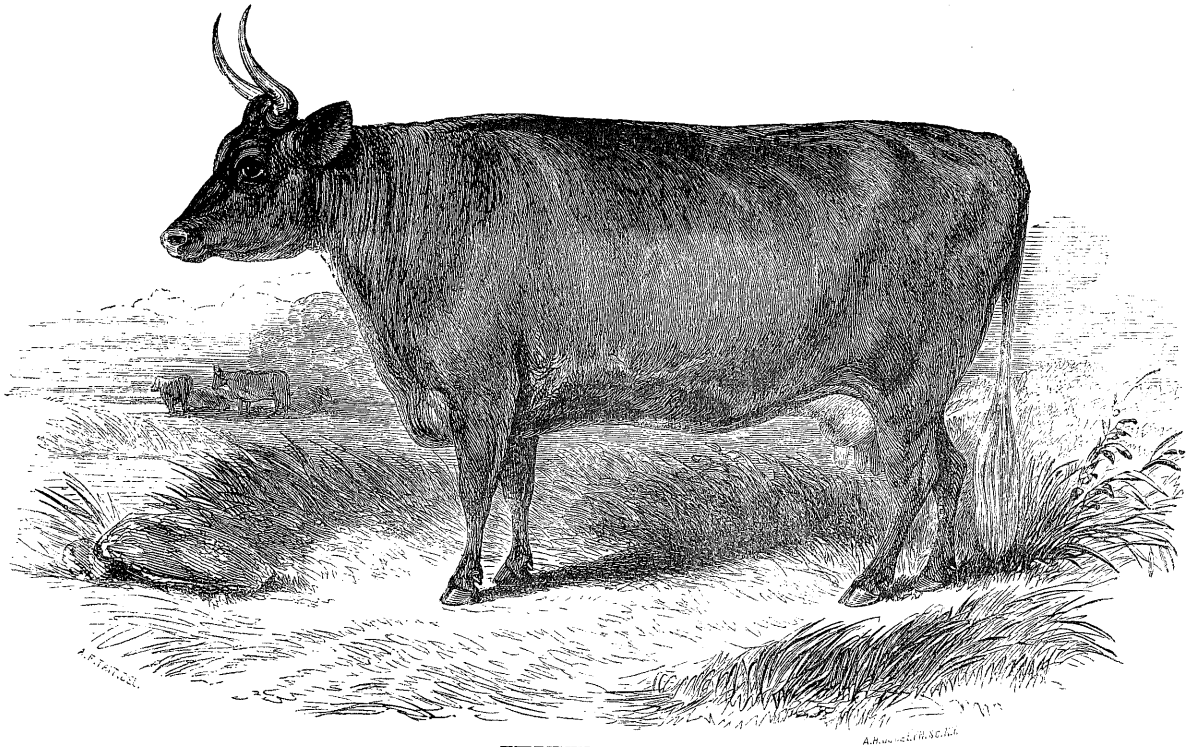
1860.



JENNY. (790.)

Winner of first prize in Class "Imported Devon Cows," at the New York State Agricultural Show at Elmira, 1855, and the United States Agricultural Show at Boston, 1855. Bred by George Turner, Esq., of Barton, near Exeter, Eng. The property of Edward G. Faile, West Farms, Westchester County, New York.

FOURTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

MAINE BOARD OF AGRICULTURE,

1859.

AUGUSTA:
STEVENS & SAYWARD, PRINTERS TO THE STATE.

1859.

BOARD OF AGRICULTURE....1859.

ROBERT MARTIN, *President.*
N. T. TRUE, *Vice President.*
S. L. GOODALE, *Secretary.*

NAME.	SOCIETY.	P. O. ADDRESS.
	(Term expires January, 1860.)	
Joseph Avery,	Lincoln County,	West Jefferson.
William R. Flint,	West Somerset,	North Anson.
Francis Fuller,	Kennebec County,	East Winthrop.
Robert Martin,	Androscoggin County,	West Danville.
Calvin Chamberlain,	Maine State,	Foxcroft.
Francis L. Rice,	West Oxford,	Denmark.
John K. Russell,	Somerset Central,	Skowhegan.
J. D. Tucker,	Waldo County,	Lincolnville.
	(Term expires January, 1861.)	
John F. Anderson,	Cumberland County,	South Windham.
B. C. Bailey,	Sagadahoc County,	Bath.
W. E. Drummond,	North Kennebec,	Winslow.
S. L. Goodale,	York County,	Saco.
Daniel Lancaster,	South Kennebec,	Farmingdale.
William M. Palmer,	East Somerset,	Hartland.
Elijah B. Stackpole,	West Penobscot,	Kenduskeag.
N. T. True,	Oxford County,	Bethel.
	(Term expires January, 1862.)	
Seward Dill,	North Franklin,	Phillips.
E. L. Hammond,	Piscataquis,	Atkinson.
Ashur Davis,	North Somerset,	South Solon.
Albert Noyes,	Bangor Horticultural,	Bangor.
Hugh Porter,	Washington County,	Pembroke.
Hiram Russ,	Franklin County,	Farmington.
Hiram Stevens,	North Aroostook,	Maple Grove.
Wm. C. Hammatt,	North Penobscot,	Howland.
Alfred Cushman,	Penobscot & Aroostook Union,	Golden Ridge.
Samuel Wasson,	Hancock County,	Franklin.

REPORT.

To the Senate and House of Representatives:

In accordance with the provisions of the statute establishing the Board of Agriculture, I have the honor to present herewith my Annual Report, embodying in the first place "a detailed report of its doings" at its last session.

The Board assembled at the Agricultural room in the Capitol at Augusta, on Wednesday, January 19th, 1859, at 10 o'clock, A. M., and was called to order by the Secretary, and Robert Martin, Esq. chosen Chairman *pro tem.*

Messrs. Dill, Lancaster and Rice were appointed a committee on credentials, who subsequently reported as present the following members:

Seward Dill of Phillips, from North Franklin Society.

E. B. Stackpole of Kenduskeag, from West Penobscot Society.

Asher Davis of Solon, from North Somerset Society.

Albert Noyes of Bangor, from Bangor Horticultural Society.

Hugh Porter of Pembroke, from Washington County Society.

Hiram Russ of Farmington, from Franklin County Society.

Joseph Avery of Jefferson, from Lincoln County Society.

Hiram Stevens of Maple Grove, from North Aroostook Society.

William R. Flint of North Anson, from West Somerset Society.

Francis Fuller of Winthrop, from Kennebec County Society.

Robert Martin of Danville, from Androscoggin County Society.

Calvin Chamberlain of Foxcroft, from Maine State Agricultural Society.

Francis L. Rice of Denmark, from West Oxford Society.

J. D. Tucker of Lincolnville, from Waldo County Society.

John F. Anderson of Windham, from Cumberland County Society.

B. C. Bailey of Bath, from Sagadahoc County Society.

William E. Drummond of Winslow, from North Kennebec Society.

S. L. Goodale of Saco, from York County Society.

Daniel Lancaster of Farmingdale, from South Kennebec Society.

William M. Palmer of Hartland, from East Somerset Society.

E. L. Hammond of Atkinson, from Piscataquis Central Society.

N. T. True of Bethel, from Oxford County Society.

Samuel Wasson of Franklin, from Hancock County Society.

William C. Hammatt of Howland, from North Penobscot Society.

Alfred Cushman of Golden Ridge, from Penobscot and Aroostook Union Society.

Permanent organization was effected by the election of officers for the year ensuing, as follows:

ROBERT MARTIN, *President.*
N. T. TRUE, *Vice President.*
S. L. GOODALE, *Secretary.*

The rules of order of last year were adopted for the present session.

BAKER WESTON was elected *Messenger* to the Board.

Messrs. Flint, Lancaster and Tucker were appointed a committee on Elections. This committee subsequently reported the above named members as duly elected and entitled to seats.

On motion of the Secretary, a business committee was appointed by the Chair to present subjects for discussion: Messrs. Goodale, True and Anderson.

Mr. True in behalf of a committee of last session, on the subject of a cabinet and library, reported in favor of asking an appropriation from the legislature to procure book cases and conveniences for preserving specimens. The report was accepted and the same committee charged with the preparation and circulation of a petition for the same. [The petition was favorably received by the legislature then in session and the appropriation granted.]

Mr. Anderson of Cumberland, said he was appointed at the last session of the Board, a committee to report upon the following topic, viz: "What further agencies for the advancement of agriculture should be adopted, and if any, to report plans, &c. Although he

had been neither negligent nor unthoughtful of his duty, he confessed that he had been unable to prepare anything upon this topic, satisfactory to himself, or which he thought would meet the expectations of the Board. He suggested that the committee be discharged from the consideration of the subject, and that pending the report of the business committee, it be discussed in committee of the whole, which suggestion was adopted, with the understanding that at this time also, members have leave to report on the condition and operations of the several societies for the past year, and regarding the position and prospects of agriculture in their various parts of the state.

Mr. Anderson had already got excused as a member of the committee, on the ground that he had nothing new to advance, but would remark, that he had presented the subject to the club of which he was a member, and many suggestions had been broached—such as the importation of best varieties of foreign stock; the establishment of a model farm; general instruction in agricultural chemistry; the employment of public lecturers to itinerate the state; the establishment of a paper under the auspices of the state, &c. Nothing definite came of the discussion, however, except a vote recommending the establishment of a library of agricultural and kindred works, under the control of the state society, to be loaned on call to local clubs and societies.

Mr. Russ of Franklin, was a member of the committee upon this subject, last year, but was unable to suggest anything of value. He would therefore speak of the condition of the society he represented. The society numbers four hundred members, have located the fair, fenced and graded the grounds, and erected thereon suitable buildings. The show last fall was superior to that of any former year. The society has purchased two full-blood Durham bulls at an expense of six hundred dollars, which did not prove so profitable an investment in all respects as was hoped for, many of the cows served by them proving farrow. Improvement was manifest in various kinds of stock and also in crops.

Mr. Wasson of Hancock, was a new member at this Board, and represented a society as yet in its infancy. He did not feel competent, at this stage of the session, to enter upon the discussion of the

topic under consideration, and preferred to speak of the condition and prospects of his society.

There has not until recently been any agricultural society in Hancock county for many years. In 1790 a society was formed, and flourished for a time, but it failed, and one of the principal causes of its failure was the impression that got abroad among the farmers, that the highest premiums could not go out of two families. The failure of this attempt left such a discouraging impression upon the old farmers of that region, that no successful effort has been made until last year to establish another. When we moved to secure a new society, we could get but seven names on the petition; but we got our charter, and the first exhibition was a decided success. We had over four hundred animals on the ground. Our farmers are now turning their attention more to the raising of calves—and are becoming interested in all the various branches of practical husbandry. The habit of our people, hitherto, has been to fish a little, and lumber a little, and farm a *very* little; but the time has come when they must pay more attention to farming—or starve. Interest is increasing rapidly. Two years ago I had books for distribution, but nobody wanted them. The farmers would not take and carry them home when given to them. Now, I cannot get enough to meet the demand. Persons have come thirty miles to get a copy of the report of our secretary. This year I have received one hundred books, and already I have three applicants to every book I have.

There is considerable attention given to the cultivation of the cranberry in our part of the state. A neighbor of mine had a heath where cranberries grow among the bushes. He simply took away the bushes, let in the light, and the result was a fine crop. In another case, sand was carted on at the rate of from six to eight loads to one-fourth of an acre. Another man started a patch on a salt marsh. He took a large variety of the cranberry, which grows on a bush about four feet high, with a bark like the dog-wood. It is not so good as the low cranberry, though very palatable. The small are worth twice as much in the market as the large. This cranberry grows on the borders of our heath or bogs, which are found in large tracts, some of them containing a thousand acres, and when you go on them they shake a long distance around you. It is at the borders of these, near the solid ground that cranberries

grow. My neighbor took up a patch two rods square, cleared off the turf, and made beds a foot square, and in each of them put seeds and covered them with straw and they have done finely.

In reply to an inquiry of the secretary in regard to the use of marine manures in his section, he spoke of the application of a mixture of muck and eel-grass and rock-weed; also, the pogy—a fish caught in immense numbers on the coast for its oil, and afterwards used very successfully as a top-dressing to the soil. Crops have been much improved by mixing the pogy-chum with gravel and ploughing it in. It is a remarkable fact that the coarse wire-grass has given place to herds-grass by the use of the pogy-chum. The chum could formerly be obtained at twelve and one-half cents per barrel; but since its use as a manure, it has risen to one dollar per barrel. Mr. W. said the effect of muscle-bed manure also was very marked. In the winter of 1839 his father had a piece of clay land which grew nothing but white weed. He hauled on one hundred loads of muscle bed, which killed out the white weed, and herds grass came up profusely in its place. Nothing but herds grass has grown on the land since then until lately, when the white weed again made its appearance. The ground was not seeded at all.

Mr. Dill of North Franklin, was not prepared to discuss the topic presented, but would speak of his society. Its condition is improving. Have not, as yet, been able to locate, although the subject is in agitation. Its geographical situation is not favorable to location. The notion among us that farming does not pay is nearly exploded. He cited several instances of successful farming. One man cleared twelve hundred dollars this year on his farm. Improvement is going on, not only in the farms, but among the people. They are waking up to their true interests.

Mr. D. presented the following statistics of exports from Franklin county, based upon an average of several years, as follows:

75,000 sheep.		
200,000 pounds wool,	- - -	$70,000
20,000 wool-skins,	- - -	15,000
30,000 lambs,	- - -	45,000
4,000 cattle,	- - -	100,000
200 horses,	- - -	20,000
120,000 pounds clover seed,	- -	15,000

4,000	bushels herdsgrass,	12,000
10,000	pounds honey,	2,000
2,000	barrels beans,	10,000
10,000	pounds lake trout,	1,000
6,000	patridges,	2,000
160,000	dozen eggs,	20,000
25	tons poultry,	5,000
45	tons butter,	18,000
4,000	bushels potatoes,	2,000
20	tons round hog,	3,200
100	tons hay,	1,000
45	tons potash,	5,400
40,000	pairs socks and mittens,	10,000
200	tons starch,	20,000
	Furs of various kinds,	3,000
	Dried apples,	62,000
	Green apples,	30,000
3,000	pounds beeswax,	1,000
	Sash, doors and blinds,	1,000
	Sole leather,	3,000
	Calf skins,	500
400	veal calves,	2,400
	Handsleds,	200
	Sale work on clothing,	2,000
	Harnesses,	1,000
	Chairs,	400
	Boots and shoes,	12,000
15,000	dozen shovel handles,	12,000
	Mop woods and irons,	500
	Sleighs and wagons,	3,000
2,000	pounds spruce gum,	400
1,000,000	shaved shingles,	3,500
100,000	sawed shingles,	250
100,000	clapboards,	2,000
	Cash for lumbering,	10,000
	Hops,	2,000
	Total,	$528,350

Mr. Dill also accompanied the above statistics with explanatory remarks upon some of the items included in the list.

Mr. Flint said Somerset county received $150,000 per annum from sheep sold, without detriment to the flocks. The statistics of Mr. Dill were no doubt true; and yet that county is now half forest. The Dead river country is capable of producing as much as the whole county now does. The same is true of Somerset county. That whole section is a most inviting field to farmers, far in advance of the west.

Mr. Dill said there was no better land in the world.

Mr. True said that the way to send the people into the settling lands, is to call attention to the resources of the state. We all remember how this was effected by the labors of Dr. Holmes, some years ago, and more recently by the labors of our secretary. He had been surprised at some facts that had lately come to his knowledge in reference to the northern part of Oxford county.

Mr. Rice said that some years ago he went over that section and from that time to the present he has had no doubt that if a young man, about starting for California or the west, with four or five hundred dollars, would go in there, and suffer the same privations, he would do far better. The best part of Oxford county is today covered with forest. There is no better field than our own state presents. Every capability of the state should be brought out, and the northern part of Oxford is equal to any part of the state.

Mr. Hammatt of North Penobscot said his society had greatly revived the last year, and more interest was felt; they held a good show the past autumn which seems to have had much influence in awakening an interest in agricultnre.

Mr. Hammond of Piscataquis said that his society had increased the interest in farming—had enlarged their premiums. A new interest has been felt in procuring the reports of the secretary of this Board, and they had been under the necessity of requiring that the volumes be passed from family to family. There is increasing interest in sheep growing. South Downs have been introduced within the year to a limited extent.

There is excellent soil in Piscataquis, and of late the farmers by deep ploughing are reaping advantages beyond the past. One field of fifteen acres, badly exhausted was ploughed three inches deeper

than ever before, and three bushels of plaster applied, and six hundred bushels of oats raised from it. There have been good crops grown in my neighborhood. One neighbor raised from one acre, eighty-two bushels shelled corn, fifty-six pounds to the bushel. Another on one acre and twelve square rods, one hundred sixty-five bushels of ears. This was on interval land. Another broke up two acres interval land, and raised one hundred sixty bushels oats. This land is flowed, and where the water backs on, it leaves the surface covered with a black mud. People are becoming more impressed with the importance of manures, and although *not much* has been yet actually accomplished, decided improvement is manifest.

Mr. Baily of Sagadahoc thought that progress in agriculture could best be advanced by learning the right use and application of soils, manures and labor. Here is a great field for investigation and we need besides to disseminate among the mass of the farmers what a part know already. He alluded to a specimen of high farming in New Jersey, which he had witnessed, and which was very successful, yielding a profit of ten thousand dollars per annum. The owner attributed his success to a free use of manure. In the course of his remarks he advanced the idea that it was unnecessary to seed grass lands provided they were plowed deep and the proper fertilizing elements applied to the soil. [This proposition was controverted by Messrs. Hammatt, Cushman and others as being at variance with the experience of all practical farmers.]

Mr. B. spoke of increasing interest within the limits of the Sagadahoc society and of a greater demand for the secretary's reports, and for other agricultural reading than heretofore.

Mr. Lancaster of South Kennebec said that what is needed most is to overcome the prevailing indisposition to engage in farming pursuits. This has been already done to some extent. The popular idea that farming don't pay, has driven large numbers of our most intelligent and enterprising young men out of the business, until few except elderly men were left to carry it on. The stampede at one time was such that the advertising columns of our agricultural journals were filled with notices of farms for sale. This is not the case now. The current has changed. People go into farming who have been engaged in other pursuits. They are beginning to find it will pay.

In reference to his society he said that much improvement had been made in stock. Some opposition was manifested to the Jersey stock, but a change of opinion is taking place in regard to its value. It is now highly esteemed for dairy purposes. The Devon has been largely introduced, people like the idea of a uniform color for matching. The Durhams are in higher esteem generally than any other stock. My own preferences are for other breeds, believing that smaller and more compact stock, are more profitable than the overgrown. He was not in favor of large cattle for working purposes; he thought the experience at the late state fair demonstrated that smaller cattle were more efficient, active and useful.

Mr. Stackpole of West Penobscot, spoke of his society as flourishing. The territory is small, comprising only thirteen towns. It consists of two hundred eight members—receiving three hundred sixty-three dollars from all sources, and paying out for premiums two hundred fifty-eight dollars. Crops within the limits of the society have increased fifty per cent. Good crops of corn, potatoes and some kinds of grain—some of barley as high as fifty-seven bushels to the acre. Buckwheat is getting to be a valuable crop. We raise as large crops of corn, I think as in any part of the state, eighty bushels to the acre being not an uncommon crop, and sixty bushels are raised by most farmers who pay proper attention to its cultivation. Some of our corn crops received premiums at the state fair. Wheat is very uncertain with us. The midge and rust injure it so that it is not sown so much as a few years ago. Barley, oats and peas are valuable, and are raised by most farmers with success. We are extensively engaged in rearing stock. Horses are raised by many farmers, and I think we produce as good horses as can be found in any state in the Union, but in my opinion too many are raised for profit. There have been some good Short Horn and Devon cattle introduced, and great interest is taken in the improvement of stock. We have not kept so many sheep as we might, but farmers are becoming convinced that they are very profitable, and will probably increase their flocks.

Dairies receive no special interest, but in this and also in some other respects we are sure of a better time coming.

Mr. Rice of West Oxford said the greatest want was suitable markets, and in this light regarded the increase of manufacturing in

Maine as the most certain and speedy method of assisting agriculture. Farmers lack capital, many go into the business of farming because they have not the means to go into anything else. Another disadvantage is, that we are unable to obtain manure in sufficient quantities. If it could be obtained we should be able to raise as large crops as any state in the Union. A different sentiment should be cultivated in regard to the profession of the farmer—he should be made to feel that his calling is laudable and honorable. He suggested the idea of so conducting the farm connected with the state reform school as to answer all the requirements of a model farm.*

Mr, Rice said the West Oxford society had purchased a lot and enclosed it, and last fall had a better show than ever before, and the society is now strong and prosperous. They have erected a building, and are nearly out of debt.

The Hungarian stock promises to excel any other that has ever been introduced in his vicinity. They are very hardy and thrive well on meadow hay. One two years old heifer, in two weeks made fifteen pounds of butter. The steers not as large as the Durham, but very hardy, and will prove superior in this respect to either the Durhams or Devons. It was imported by Mr. Cushing of Massachusetts, and introduced into the county by Mr. Pierce of Hiram.

Mr. Porter of Washington reported increasing interest and highly commendable progress among the farmers of his vicinity. More attention is paid to manures and composting them, to farm buildings and fences—new implements and improved stock.

Mr. Drummond of North Kennebec said his society had secured grounds, and located at Waterville, they were in debt for it and were making an effort to pay it. We have some full blood stock, and grades of various kinds. Sheep are increasing among us. There is an increasing interest manifested by our farmers in agricultural matters. This is greatly helped by the formation of farmers' clubs. These have had the effect to help all kinds of crops and to improve both our stock, soil and productions.

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* The same idea was broached in the original draft of the report on Agricultural Education and elicited some discussion. The plan has been fully tried in Massachusetts during some years past and found unsatisfactory. The connection which has existed between the Board of Agriculture and the Reform School farm was dissolved last year to the satisfaction of all concerned.

Mr. Davis of North Somerset said the society he represented was in a healthy condition. At the last fair its show of neat stock surpassed any that he had ever seen, with one exception—the last state fair. The Durham cattle are favorites, with his neighbors, and it was lately thought the Hereford made a good cross, but he thought the Devon the best, all things considered. The Durhams are very large, and coarse limbed, and the Devon cross seems to make the handsomest, best built animal. The Ayrshires, he thought well of. The Devon seems a little undersized, but the Durhams are too large and they cannot stand our winters so well. He thought the Durham and Devon crossed, to be the best for northern Maine. There is a good deal of interest in sheep, a cross of the French and Spanish Merinos is deemed the best, the Cotswold are highly esteemed, although as yet the flocks are small. The society is doing much in various departments, especially in stock. We feel that the labors of the Board have accomplished great good.

Mr. Fuller of the Kennebec society, said that the increase of interest in his neighborhood has been very considerable. The farms and products are steadily improving in value. He alluded particularly to the orchards of the county. Farmers in Kennebec are raising from fifty to five hundred dollars a year in apples. He knew one man in Winthrop who raised last year two hundred barrels of russets, which will sell at three dollars per barrel. The stock of the county is improving. The general opinion is, that the Durham blood is essential to perfect stock. A cross between the Durham and Alderneys is better for dairies. On the whole the society is prospering.

Mr. Avery of Lincoln spoke of the improved condition of his society, and the increased interest felt in agriculture throughout the county. The people have been hitherto largely engaged in shipbuilding and limeburning, but the recent depression in these branches of industry has given a new impetus to agricultural pursuits. It has taught them the importance of relying more upon the cultivation of the soil, for the means of livelihood. They are now giving much attention to manuring, to the clearing up and reclaiming lands heretofore regarded as worthless, and which have in most instances rendered good returns for the labor expended on them. Grass is becoming a very important crop and more hay is raised and shipped

than is consumed. The fair last year was a good one, the show of stock unusually large and indicating a satisfactory improvement in breeds. In reply to a question of Mr. Flint, he said that wages to farm hands were from eight to twelve dollars per month. The experience of the best farmers in his section shows that it will pay in the long run to employ suitable help at the highest prices.

Mr. Flint of West Somerset, said his society, which is the oldest established in the county, had been distinguished for improvement in stock and sheep husbandry. The latter, especially, had been very earnestly prosecuted. The amount of wool raised exceeds that of any two counties in the state. As to cattle, Durham grades are preferred, especially for working purposes. Other breeds, perhaps the Devon and Hereford might be introduced to good advantage. The interest in horse raising has declined of late, not because good horses are valued less, but because the business had assumed an undue importance. It is a bad state of things, in a community, where horses are kept in flocks. and sheep not at all. A good degree of attention was devoted to labor saving implements and machinery. Sub-soiling as yet, had been little practiced, although, in his judgment it deserved great attention. The mower and harvester had been used, but failed in giving complete satisfaction owing to their heavy and cumbersome make. The annual show and fair was well attended, and was a good exhibition. Interesting addresses by Messrs. Lang and Sayward, were listened to by a large audience. The society has not received, heretofore, much profit pecuniarily from its shows—their fields are open and their exhibitions free. This induces a large attendance of those who are really interested in agricultural matters, but little money is made by it. Measures have been taken to enclose grounds and establish a fee for admittance to future exhibitions, in order to replenish the treasury. He thought the policy, however, somewhat doubtful. The influence of this Board, and the reports of the secretary had been most salutary. Men of all pursuits sought for the reports and read them with great interest, and he believed a most desirable revolution in public sentiment, upon the subject of farming, will be the result of the knowledge thus acquired.

Mr. Stevens of North Aroostook, said his society has increased one hundred per cent. within the year. The county is admirable

for stock, the true interest of the farmer. Now, instead of raising grass-seed for sale, as formerly, we sow our seed, and raise hay for our stock. The Devon is highly prized, as far as tested. So is the Durham and the Hereford. The county produces large numbers of fine horses. The sheep are very superior and the mutton excellent.

He presented some statistics of the crops in township letter C, in first range, lying next to the boundary line of New Brunswick, a few miles south of the Aroostook river. Two years ago last summer, this township was surveyed by the state, and at that time four men only had made a beginning in it. Last summer there were thirty who raised crops. Another season this number will be greatly increased by those who prepared their land last summer for their first crop. The amount of grain of all kinds was 12,754 bushels; of potatoes and turnips 3,521 bushels. This, at fifty cents per bushel, which is a very low figure, over 1,000 bushels being wheat and rye, would amount to $8,137.50. He believed that the crop in the township next season, will be one hundred per cent. greater than last season. There are one hundred good farming towns in the county which are capable of doing as well, and in a short time they will be peopled by the hardy and energetic sons of New England. For the encouragement of those who wish to settle in Aroostook, he would say, that there are several townships yet unoccupied, lying along the borders of the county adjoining New Brunswick, and that the state is anxious to give it to actual settlers, while the British are building a railroad along the boundary line which will serve the purposes of the settlers as well as if built (in the same place) at their own cost.

He spoke of one settler who commenced—a stranger and ignorant of the country—in June, 1856. He employed a man to clear forty-seven acres; the trees were felled and limbed, and in the summer of 1857 the land was burned. May 10, 1858, he sowed five and one-half bushels of wheat on five acres, which produced one hundred forty-three bushels. Oats, two thousand bushels on twenty-seven acres. Millet, ten bushels on one-half acre. Buckwheat, one hundred bushels on three acres. Rye, two hundred eight bushels on eight acres. Potatoes, two hundred bushels on one and a quarter acres. Rutabagas, four hundred bushels on two acres. His land, clearing, interest, labor, &c., cost $1,094. The whole

product is worth, at market valuation, $1,357.50. The net profit of the crop for last year, after paying all expenses, $263.50. He is perfectly satisfied with the place as his permanent home.

Mr. Cushman of Penobscot and Aroostook Union said, the society which I represent embraces a territory seventy-five miles in length; consequently, those at the extremes neither join the society or attend its fairs. During the short time our society has been in operation, its influence is very manifest. Improvement in the mode of cultivating Indian corn, the selection of seeds, the cultivation of fruits, and in neat stock, has been quite extensive. The past season, although most unfavorable by reason of severe drouth, excessive wet, and early frost, has produced some very good crops. They are reported of eighty-five bushels of corn, thirty-nine of wheat, twenty-five of rye, seventy-five of oats, seventy-two of buckwheat, over four hundred of potatoes, and nine hundred eighty of carrots, per acre. It is now demonstrated that fruit can be grown there as well as in other sections of the state. At our last fair about fifty varieties of apples were exhibited, well grown and matured. The smaller fruits flourish abundantly.

Improvement in neat stock is just begun. At our last fair were two calves—one only four months old, weighing four hundred seventy pounds, and the other sixteen and one-half months old, weighing 1,300 pounds; and other good stock. Our farmers formerly raised large quantities of hay for lumbering purposes, but now see the evil of it, and are turning their attention to stock raising. Sheep are rapidly multiplying; and their large size and good condition show that the climate and soil are admirably adapted to them.

Buckwheat, though formerly neglected by many, is now considered the most valuable crop we have. It produces a large crop with very little labor. It is best sown as late as the middle of June; and for domestic fowl and fattening swine, it has no equal. It is common for pigs fattened upon it, to weigh when fifteen to eighteen months old, from four hundred to nearly six hundred pounds.

I have no means of producing statistics, as the gentleman from Franklin did; yet could I do it, the sale of hay, grain, live stock, beef and pork, would show an exportation of a very considerable amount.

The following communication from Dr. Rogers, secretary of this society and resident in Patten was read:

"In consequence of the injury done to wheat by the rust and weevil in past years, the farmers in Patten have engaged more largely in growing oats. It is a surer crop and finds a ready market at a fair price. Rye yields a fair crop here and is a good substitute for wheat, when the rust and weevil destroy wheat.

Corn is a surer crop in this climate than wheat. I have raised good sound corn every year, with one or two exceptions, for the last ten years. The Dutton corn is the best variety. I think corn does best, planted on the same land, several years in succession. The land should be suitably manured each year. It should be planted as early as the twentieth of May, and unless there should be a heavy frost in August, which is seldom the case, it will get ripe. I think planting the hills near together, three feet between the rows and twenty inches between the hills, increases the crop.

Wheat in good years yields from fifteen to thirty-five bushels to the acre. Our farmers commonly raise wheat on burnt land. But it will grow well on ploughed land if well manured. I think wheat sown early in May, or in April if the season is favorable, is most likely to do well.

Mr. Jacob Frye of Patten, raised in 1857, 1,350 bushels of oats, worth in cash $675. Raised in 1858, 658 bushels of oats, worth in cash, $329.

Mr. Andrew McCourt of Patten, raised this year, 587 bushels of oats, worth in cash, $293.50.

Messrs. Samuel and William Waters of Patten, raised this year, 789 bushels of oats, worth in cash, $394.50. Also, 58 bushels of wheat, worth in cash, $87.

Mr. John R. Hammond of Patten, raised this year, 800 bushels of oats, worth in cash, $400.

Mr. William H. Hunt of Patten, raised this year, on eight acres of land, 400 bushels of oats, worth in cash, $200. Also, 60 bushels wheat, worth in cash, $90.

Mr. L. Rogers of Patten, raised this year, 371 bushels of oats, 53 bushels of rye, worth in cash, $228. Also, 20 bushels of corn, worth in cash, $30. Income of four cows, $109.

Mr. Samuel Wiggins raised on his farm in Patten, 38 bushels of wheat on one acre, on pasture land ploughed in June, and cross ploughed in the spring.

Mr. James B. Hill of Patten, raised 36 bushels of wheat on one acre of land ploughed in the spring and well manured.

For the oat crop, Mr. Frye ploughs in a crop of grass in June or July and lets it lay in furrow until the following spring, then harrows it with a heavy harrow, but does not cross plough.

Mr. Waters ploughs in a crop of grass in June or July, and cross ploughs in the fall. Land cultivated in this manner will yield from forty to fifty bushels of oats to the acre."

Mr. Dill mentioned the case of a farmer in Rangely, named Toothaker, who raised 1,400 bushels of grain, and 221 tons of hay, which paid him a profit of $1,200. He also called attention to the fact once before mentioned by him, of a piece of ground which was cropped with oats five years successively, the yield increasing from year to year from twenty to forty bushels to the acre.

Mr. Hammatt said we might mistake if we were guided by such statistics. He knew a man to raise fifteen successive crops of oats, but it would be hard to tell what was raised the last time. He ploughed in his stubble and used no manure. Towards the end the yield was not worth harvesting, and the land was ruined for grass. The idea that the productiveness of land thus treated increased instead of deteriorated, he believed was contrary to all experience. If it were true, farming could be carried on with very little labor or expense.

Mr. Dill said he called attention to this subject for the purpose of eliciting discussion. The ideas of Mr. H. were mainly in accordance with his own.

In case of the land above referred to, it was weedy and bushy, and he had no doubt that culture improved it. He had known of other places where, because the land was not properly subdued, people supposed it was ruined, when it was only not properly tilled.

Mr. Cushman said that oats were a very exhausting crop, and it was a fact generally understood, that grass will not catch after repeated cropping with oats. The plan was a ruinous one.

Mr. Davis of North Somerset agreed with the speakers on this point. He had known instances in his vicinity, where farmers had raised oats a few years, obtaining fair crops, but the land when seeded down would not catch, and all attempts to redeem it had been only partially successful. Oats should only be sowed on new

lands, or where the soil is highly manured, as for other crops. He mentioned a man whose land had run out by this method, but had been only partially reclaimed by hauling on muck and manure, the ruinous results being still apparent. Rotation of crops is the only true method.

The business committee reported a series of topics for consideration, which were assigned to committees, as follows:

No. 1. To what extent, and by what means can labor saving machinery and improved implements, be most advantageously introduced? Messrs. Chamberlain, Davis and Fuller.

No. 2. Is it as needful for farmers to educate themselves thoroughly in their calling, as for mechanics, physicians, merchants, or lawyers? If so, by what means can it best be accomplished? Messrs. True, Porter and Russ.

No. 3. Ought farmers to hope for success without such constant and undivided attention as warrants the hope of success in other branches of business? Messrs. Anderson, Hammond and Stackpole.

No. 4. Is it advisable to urge the completion of the geological and agricultural survey of the state? Messrs. Wasson, Cushman and Dill.

No. 5. Is there need of fences other than to enclose pasture lands? Messrs. Flint, Lancaster and Chamberlain.

No. 6. What crop, if any, in our climate and system of husbandry can be made to yield similar advantages to those derived from the turnip in England? Messrs. Hammatt, Noyes and Anderson.

No. 7. Ought the Board of Agriculture to be empowered by law to fix the times of holding the shows of agricultural societies? Messrs. Rice, Drummond and Bailey.

No. 8. What proportion of the funds of agricultural societies, if any, should be expended in promoting general farm improvements? Messrs. Dill, Goodale and Stevens.

No. 9. What books may we best recommend to agricultural societies to be given in premiums? Messrs. Goodale, Avery and Noyes.

No. 10. Is it expedient that the Board of Agriculture at this session recommend the breeds of stock, horses, neat cattle, sheep and swine, most profitable to be bred and raised by the farmers of Maine? Messrs. Hammond, Palmer and True.

No. 11. Can the keeping of domestic fowls be made profitable? If so, what kinds are best, and what is the best treatment and method of using their manure? Messrs. Rice, Russ and Tucker.

No. 12. Can the cultivation of the small fruits be made profitable? If so, what varieties are best, and what is the best mode of culture? Messrs. Noyes, Dill and Lancaster.

No. 13. By what means can the settlement of the new and fertile soils of Maine be best secured? Messrs. Stevens, Cushman and Dill.

No. 14. What breeds and classes of horses are most deserving attention and encouragement in Maine, and what is the best mode of rearing and training them? Messrs. Tucker, Davis and Wasson.

Mr. Chamberlain subsequently reported on the first Topic, as follows:

"To what extent and by what means can labor saving machinery and improved implements be most advantageously introduced?

This topic, in the minds of your committee, is so intimately connected with the whole subject of husbandry, if not underlying its whole successful prosecution, as to invite a wide range of thought in its consideration; and if in our hasty treatment of the subject, we have found it easier to deviate somewhat from the direct line of sight, we hope to be pardoned for circumlocution, if we succeed in coming to the text in the end.

Taking a view from our present stand-point, we find the circumstances attending the American farmer, are to a certain extent peculiar to the nation, and distinctive from that of older and more densely peopled countries. So long as we have cheap fertile lands, inviting the husbandman to enter upon and enjoy, so long will the wages of labor be high compared with products.

Manufactures are affected alike with the farm. This condition of things has tended to stimulate the inventive genius of our people to substitute machinery for the bone and sinew of human organism. In the department of manufactures, this substitution has been carried very much farther than in the agricultural. This arises in part from the conditions in the case, yet an item in this difference undoubtedly is the difficulty that inventors and makers of improved implements encounter in the apathy so generally prevailing among farmers themselves in relation to adopting such improvements.

In past time it has been remarked of farmers as a fault, that they are too slow—too indifferent to progress. This may be their *virtue*, as the conservative power of the commonwealth. But we fear the circumstance as related by the English nobleman too often has found a counterpart. Some time after he had sent his people an improved plow, he found it had been laid aside; when they assigned as a reason—"we be all of one mind, that it make the weeds grow."

Farm laborers often lack the skill and tact requisite to adjust and apply a new and complicated machine or implement. The machinery of the workshop is superintended by schooled intelligence.

The farmer, unlike the manufacturer, seldom goes abroad to learn from observation the workings of the *wonders of progress* that are abroad in the world. The success of the merchant and the manufacturer, depends on their intelligence and quick adaptation of means to ends. The farmer may remain at home, and "set his face as a flint," against book-farming and all innovation; and continue to live—merely vegetate by a round of labors such as were performed in a former age; but without an "eye to the main chance," he is often found grumbling at the profligacy of the times, and the ruinous, "high-pressure," progress of the age, that recklessly outruns all sober sense, sedate customs and commendable stability.

We, who had our start in life in the rural districts, find that we need something like the startling blast from a steam-whistle to quicken our pulsation and keep us well up with the progress of the day. The boy of today is a being measurably progressed from the boy of a past age. He opens his eyes on busier scenes. At every turn his points of contact receive a stimulus. The well appointed school-room, improved books, a more extended round of studies, a freer intercourse with men and things,—these improved facilities early develop the man and fit him to occupy an advanced standpoint.

With this glance at our condition, we may look forward, and be entirely safe in saying, that we are not likely to be overwhelmed with labor.

Whether we are to continue as heretofore without a leading agricultural interest, or whether we shall aim to make stock husbandry a prominent feature in our practice, it abates nothing from the interest and importance to be attached to the inquiry, whether we

shall earnestly seek to accomplish greater results by improved mechanical aids.

Gentlemen of this Board, who have carefully followed our able secretary through his valuable reports, must see clearly the capabilities, and the fitness of our soil for grazing as a leading pursuit; and are prepared to predicate an opinion, that we may look for a vast increase in the numbers and value of our domestic animals at no distant day, on something more tangible than the idle fancies of a fertile imagination. Allowing the convictions of gentlemen to coincide with the views of the secretary on this point, and we are ready to proceed with our inquiry as to the connection our Topic holds to our general interest.

One English writer says, "we are justified and compelled to adopt every useful implement and mechanical invention which will cheapen the cost of production." This word, "justified," clearly refers to the condition of things there, under which it might look as injustice to the dependent laborer who delved with the spade, to introduce machines that should supersede spade labor. That such introduction cheapened the cost of production, there seemed to be no doubt. Again we read from an English farmer, "*Root cultivation* is the farmer's sheet anchor and the nation's safety-valve. If we build a house on a poor foundation, the labor of the superstructure is wasted; and unless we commence farming by endeavoring to produce great green crops, we shall find our future success and stability very uncertain indeed." An American farmer says, "many farmers who now pride themselves in raising fair crops of oats, would find it to their advantage to raise twenty times their value in carrots on the same amount of ground."

A common saying in the Mother country may be borrowed, and in time hold good here as there, "without *roots* there is no stock; without stock there is no manure; without manure there is no grain and hay." While the statistics of England and of the continent of Europe, show beyond cavil, that the "*shift system*," based on the root crop, has tended directly to increase the value of domestic animals and the acreable products of the cereals more than a hundred per cent. in a quarter of a century, and vastly augmented the product of pasture and meadow, may we not safely follow in the same direction? When it has been demonstrated and made clear to our

comprehension, that the product of an acre of carrots or mangolds is an equivalent for fifteen or twenty tons of hay, may we not safely advance in root-culture beyond the bounds of the kitchen garden?

The farmer of Maine needs but few words from us on the necessity of improved implements for harvesting purposes. The best scythes, forks, horse-rakes, grain-cradles, &c., that can be obtained, are being tried and adopted; for like his razor, he has a *feeling sense* of the importance to be attached to their good qualities.

Mowing machines have been bought and used to an extent which plainly shows a creditable desire on the part of our farmers, to avail themselves of the advantages to be derived from a perfect instrument of this sort. So much attention is now being given to them, so great is the concentration of mechanical science on this machine which is destined to occupy so important a position in these northern states, as to warrant the hope that it may, ere long, emerge from its present imperfect condition,—modified and improved in the essential of resistance to the propelling power,—simplified and perfected so as to do our work in a fully satisfactory manner. Manufacturers will then have no reason whatever to complain that farmers fail to give them due encouragement.

But in the matter of tillage, and in preparing crops for market or consumption,—the power that has been conferred on this Board in the organic act—*the power to talk*, may profitably be directed and applied without stint. In this, as in spiritual affairs, we need "line upon line, and precept upon precept." While we aim high for future achievement, let us make sure of progress, even if it be slow. It is wise in us today to learn from those who are in advance of us in the general progression.

We know an intelligent farmer and market gardener, who ten years ago tilled thirty acres, employing sufficient force to ensure greatest profits; and who made it a point to secure and test every farm implement that came before the public as an improvement. At the close of the last season, he informs us, that he has in the last ten years gradually extended his operations to one hundred twenty acres—the general style of crops continuing the same,—and has in the mean time had no occasion to make addition to the number of his men.

This fourfold increase of worked area, has been accomplished solely by adopting every improvement in tools and machinery.

In some portions of our state, farmers are now conducting their operations with less manual labor than formerly, by reason of increased wages. This decrease in help is hardly compensated by facilities afforded in the use of the few improved implements they have secured.

Farmers have been discouraged from growing roots by reason of the great amount of labor required in their culture. The recently published account of the premium crop of carrots in Kennebec county is noticeable. The crop was grown on a sandy loam,—the two preceding crops being carrots; the dressing, compost—made mostly of muck; all the antecedents tending to show good tilth and the absence of weeds; yet the item of weeding is set down at the rate of twenty-four days per acre. Reasoning from our experience with a stony soil, we should conclude that by the use of a wheel-hoe that may be made for a dollar, the above crop could have been tended with half that expenditure of time, and the ground left at the end of the season, absolutely free from weeds. Field culture of roots, on any extended area, can be conducted with greater economy by horse-implements than by hand. But other means and agencies than mere words must be summoned to aid us in fixing in the minds of the generality of farmers, a due appreciation of the importance of this subject. They often find words alone very evanescent things. They want a "visible and tangible embodiment of science" in the shape of improved implements, often thrust in their faces.

Too much importance cannot well be attached to agricultural exhibitions, for the impetus they have contributed to such advancement in the art of husbandry as has been witnessed. These call the farmer and his sons from home. It is their school, the terms of which are short, but its lessons have an enduring impress. It is these exhibitions on which we must rely more than on our use of language, for the success that shall attend the present effort. At these shows, while we look with pleasure and pride on the results of labor and skill as displayed in our stock, and in the products of the field and the garden, we look on the other side with equal interest, to the implements by the aid of which all these mighty results have

been accomplished. We may be privileged to speak of what the State Agricultural Society has *not* yet accomplished in its short history, to aid the inquirer in his researches in this direction, and what it may seem desirable that it should attempt to accomplish in the immediate future.

Through the want of pecuniary means to indulge in any extended system of liberality towards the mechanic, no money premiums have been offered to be awarded beyond the state. Beyond the common privilege to be enjoyed on these occasions—that of advertising—but little inducement has yet been extended to mechanics either within or beyond the state, to fill up our exhibitions. The hope of even an *honorable mention* in the society's transactions, may now well nigh have died out from the mind of the most sanguine.

From the first two exhibitions no reports in that class have yet reached the public eye. From the *third*, a brief report is found; and we wish to be understood as aiming no disrespect in any direction, when we express ourselves in relation to it, that it comes very far short of what such report should be.

In relation to the *fourth*, and coming report for that class, we will venture the prediction, that new and important machines, designed and apparently adapted to supply pressing wants, are passed over without even a mention. We say never a word of this by way of complaint for any neglect of duty by any gentleman.

In the workings of these voluntary associations, men are invited to the post of judges, with neither opportunity on the part of the executive of the society to examine into their fitness to discharge the duties of the trust, nor power to so order circumstances as to secure their attendance. Gentlemen, through their love for the cause, will make an effort to respond to such call; and often at the sacrifice of business they make long journeys, spending time and money, and depriving themselves of the enjoyment of the show in its other departments,—and when all is passed, we have not left to us even the miserable right to complain of anything, short of gross acts of favoritism or rank injustice.

Much importance is, and of right should be attached by the public to awards of the state society, and if these shall be incorrectly made, much mischief may be done by misleading the farmer, and

encouraging the manufacturer to continue to produce what may prove a useless article, resulting in his loss in the end.

With all the difficulties and embarrassments inhering to this organization,—yielding slowly and reluctantly to our desires for progress, still we are compelled at the present moment, to look upon this as the highway over which to direct our efforts for the acceleration of that progression, which is already sure,—but to our minds too slow to keep time with the music composed by the secretary of this Board, as the *Farmer's March.*

After all is done that may be, to secure the presence of implements at the show, a great difficulty is encountered in the fact that men of ordinary perceptions,—even any man,—may be wholly misled in judging of new mechanical combinations, without an opportunity to base an opinion upon practical trials. At the time, and during the continuance of a show and fair, such trials cannot be entered upon and conducted to any great extent. With the opinions at present entertained by your committee, in regard to the radical defects in the great majority of tools now in use in the state for the pulverization of soil, we deem it our duty to call the attention of the state society to this point, and respectfully and earnestly recommend that a trial of plows and other implements be by them undertaken and prosecuted, at an early day, under such regulations as, in the opinion of the society, may result in correct decisions.

Agricultural implements are now manufactured in the state to an extent to meet a very considerable portion of the consumption. Plows in particular, are probably made to supply nine-tenths of the demand. Of this implement of prime necessity, the principle involved in the best phase of its construction,—the extent of its sliding surfaces,—probably abstracts two-thirds from the propelling force, to overcome the friction. With so small a portion of absolute power remaining for direct effect, it may readily be concluded that plows variously proportioned may differ widely in their efficiency. Plows may be found in the market so essentially differing, that one ploughing with one implement will produce a finer tilth than two ploughings with another. In our most hopeful moments, we cannot look for the plow to be dispensed with for some time to come.

As we have no model of excellence—no standard of perfection in

the plow anywhere, Yankee ingenuity never having brought it strictly under the application of scientific principles we have no reliable guide in our selections short of the trial.

But few trials of plows are on record. One only has ever been attempted on this Continent, that resulted in any marked success. The one had at Albany in 1850, conducted by a committee appointed by the State Agricultural Society of New York, is full of instruction, and may, so far as their experiments extended, be safely taken as a basis for operations here. Sufficient time has elapsed since that trial to witness essential modifications in the implement, whether for better or worse, no one may presume to know. The expenses of a trial need not be very great.

A scale of premiums, open to competition, would be desirable; and plows of all the patterns now made and sold in the state, should be collected and passed upon. Men of competent qualifications may be induced to aid the cause in the capacity of judges, by the payment of their current expenses. This trial should embrace harvesting and other machines.

Encouragement should be given for the introduction and trial of machines, other than plows, for deep and thorough pulverization of the soil.

The society should own a dynamometer for testing the amount of draft. A good instrument may be had for fifty dollars.

Hoping to see the means provided and the preliminary steps soon taken for the accomplishment of the important purposes here briefly indicated;—we only desire to add definitely our opinion, that the extent to which each individual farmer should introduce improved implements, may be limited only by the means at his command for such purpose; subject only to that condition of things when he cannot longer add machines nor employ brute force to propel them, as a substitute for, and as an alleviation of the "wear and tear" of the only animal who has a soul; and the *means* and *agencies* to be employed for supplying that knowledge, through which each for himself, will see, understand and act for his own best interest, such as are feebly indicated above.

All of which is respectfully submitted.

CALVIN CHAMBERLAIN, *per order.*

The remarks upon mowing machines in the report as first read,

elicited some discussion, which was shared in by Messrs. Anderson, Flint, Goodale and others. A slight modification of the language being made by the chairman, (and which is incorporated above,) the report was unanimously adopted.

Mr. True, chairman of committee on second Topic, reported as follows:

"The subject of Agricultural Education has, for many years, been an important problem to the men of progress in this country. Theorists have been inclined to look to European countries for a solution of this question; but whenever this has been tried, it has resulted in an attempt to engraft upon American soil, habits, customs, and modes of agriculture entirely different from what this climate and country will warrant.

Agricultural schools and colleges have been organized in Europe with good success. But it must be borne in mind, that in Europe, men of all classes are in a certain sense, cultivators of the soil. In England the landholder may have his thousands of acres under cultivation. He wants a superintendent of such immense estates. He must be a man educated to agriculture as a science, and as a profession. He secures a man thoroughly educated for this purpose, who, with the title of land steward, is well acquainted with agricultural chemistry, the laws of breeding cattle, in fact, everything pertaining to his calling. This superintendent calls to his aid the poor farmers, who are hired at the lowest possible price, to carry on the labor under his direction. These are virtually slaves to the better educated men.

But we find a different state of things in this Republic. Equality of thought, and equality in social and intellectual position seems to be the watchword in agriculture here. Adopting the European method of cultivation, we must virtually reduce to servitude nineteen-twentieths of our rural population for the advantage of the other twentieth. The heart of every American freeman revolts at such a thought.

We must then come to the conclusion, that the genius of our institutions will not admit the introduction of agricultural schools and colleges on the same basis as in Europe. Under our present system of agriculture, it is expected that every man and boy shall devote his energies to manual labor. No substitute for this has yet been

found. In our changeable climate, confining a young man within the walls of a school-room for any length of time, almost invariably enervates his system, and he loaths the sight of agricultural labor. Germans may sit in their chairs and smoke eighteen out of twenty-four hours and grow corpulent by the process; but in this country it is entirely different.

In accordance with the spirit of our institutions, education should be general, as well as particular. A few men should in every profession have a special education for some special department. Every community needs at least one skillful *surgeon*, though it have many good *physicians*. So we need a few men in our country who are pre-eminent as chemists or as veterinary surgeons, or mathematicians, but to make every body a chemist or mathematician is one of those utopian ideas that will never be realized. Your close book student is apt to become the abstract thinker, but poorly fitted for physical labor. Young men too will repair to some institution and attend to the study of chemistry, and the fond father hopes to have his son with him on his farm. But the boy has seen an opening somewhere else, and he enters it, leaving his father to plod along the same old way. The chairman of your committee has had some experience on this point sufficient to substantiate his position. He could enumerate several hundred young men who have attended to the study of chemistry, and many of them agricultural chemistry and mineralogy; but he can refer to only two of that whole number who have become practical farmers. Not that their education would be lost to them or the community, but it is diverted from its original design.

We must then, come to the conclusion, that under the present influences bearing upon us, it will not be the best policy to pursue, to establish agricultural schools with the expectation of directly educating the farmer.

It must be borne in mind, that we have in Maine, at least one hundred thousand persons engaged in agricultural labor. To educate so large a number must be a work of time, and whatever mode may be adopted, must be, as much as possible, adapted to the great mass of farmers.

The question then arises, how shall the farmer be better educated? Here is a broad field of inquiry, and your committee believe it can to a certain extent be answered.

We think we must first look to the elevation of the common school where every boy is expected to lay the foundation for all his future success in life. It is a fact, that any boy can acquire sufficient knowledge of arithmetic, grammar, geography and penmanship in the common school, at the present day, to prepare him to pursue any special branch of study to fit him to be a scientific farmer. Now how shall he know something of chemistry? In almost every town, there is a high school, or academy, at least, one term in a year; and for the want of something better, let the young man attend to the study of the elements of chemistry for one term only, if not convenient to remain longer, and he can after that, be his own teacher if he will.

The intelligent and successful farmer must be a constant learner. The lawyer, who lays aside his books, is soon out of practice; the physician, who is not posted up in every new improvement, will soon be outstripped by his competitor; and so will the shrewd farmer at the present day find it equally necessary to catch at every new mode of cultivation, every new implement of real value, and new principle advanced.

With this spirit of inquiry he becomes a reader, and a thinker. He is thereby stimulated to exertion.

But farmers want models before them.

It is said, that the late Professor Cleveland, when he entered on his duties as professor at Bowdoin College, did not know one mineral from another. A small box of rocks picked up by him, and sent to a neighboring college to be labelled, was the first and probably the only direct instruction on the science from teachers which he ever received, yet he acquired a world wide renown in that science. The reason is this. He had made a *beginning* in the science, and then could pursue it alone.

Many a farmer will express a wish to become acquainted with chemistry. He buys a work on that subject, but it is all a sealed book to him, and he throws it down in disgust. Now he needed a little instruction from some friend in order to give him a start, and then the whole difficulty is overcome. We need good models in everything. A model farmer influences all around him. If we had good teachers in everything, we should all be better scholars.

The practical farmer is in a scientific and practical school when he frequents the farmer's club.

Perhaps there is no agency so effectual towards stimulating farmers as this humble one. Practical, common sense men can then educate themselves in almost everything.

Another step not yet sufficiently noticed, is a small agricultural library in every farmer's home. Almost any man can lay out five dollars for provender for a favorite horse without any difficulty, to whom five dollars expended in books would look frightful. Five dollars judiciously expended in books will, if carefully studied, make a learned farmer. Let the farmer purchase Browne's Book of Manures, a Fruit Book; one on the Diseases of Animals, another on the Breeds of Animals, one on Agricultural Chemistry, the simpler the book, the better. With these books, together with his agricultural papers, State and Patent Office Reports, and other matter pertaining to his calling, he will become the high minded, intelligent and successful farmer.

As preliminary to the establishment of agricultural institutions, might be mentioned a course of lectures to farmers, delivered in a plain, simple manner, by a competent person, in such a way as to induce the formation and support of the farmer's club. As the presence of a few minerals gave Professor Cleveland a stimulus to prosecute successfully his favorite study, so the presentation of the simplest truth, in the form of lectures, will excite many a young farmer to pursue the study and practice of scientific farming.

It is believed that a work on Agricultural Chemistry more simple in arrangement than most of those now in use would be of utility to the great mass of that class of farmers who have within them the spirit of inquiry, but whose early advantages of education have been more limited than are enjoyed at the present day.

Your committee believe it as necessary for the farmer to be as thorough in his profession as that of any other occupation to ensure complete success. The house carpenter, who becomes complete master of his trade, and knows how to draft his work, is sure of a higher compensation than he who knows nothing but to follow another. Whether we acknowledge it or not, "*knowledge is power*," and the greater our knowledge of our calling, the greater our influence and command over the minds of others. In other occupations it is presumed that the individual is already acquainted with his subject before he comes before the public; then why not the farmer?

Your committee wish now to express their convictions in regard to an agricultural school as a means of advancing the cause of agriculture. That the time will come when such a school will be established in Maine, your committee entertain not a doubt; but it will, if successful, be a model school for the few, who shall be the teachers of the many. Your committee are of the opinion, that measures to elevate the condition of our primary schools should precede that of an agricultural college. In due time, such an institution will be an efficient aid to the scientific farmer.

Could some better arrangement be made by which a portion of the public money expended for primary schools should be devoted to the special study of the higher branches by young men, it might be one step in the right direction towards a thorough education of farmers.

Finally, your committee express the opinion, that the farmer should, first of all, learn to respect himself, and he will soon secure the respect of every other class of society; and it will serve to elevate him, to that social rank in society which he really deserves. Let him educate his body, mind and heart, so that when the body begins to fail, his intellect will still be active, and when that too, begins to wane, he will still have a warm and well cultivated heart beating within the walls of his breast, to sustain and cheer him in the decline of life, and prepare him for a peaceful rest and a blessed immortality.

All of which is respectfully submitted.

N. T. TRUE, *Chairman.*

The report as above was adopted. It embraces several alterations which were made by the chairman, after discussion by Messrs. Wasson, Flint, True, Anderson, Martin, Porter, Goodale and others; and so much as referred to the establishment of a model farm upon the lands connected with the State Reform School at Westbrook, was stricken out.

Mr. Anderson, chairman of committee on third Topic, reported as follows:

Your committee on Topic No. 3, have given it attention, and report that farmers are *not* to hope for success without bestowing upon their business such attention as warrants the hope of success in other branches of business. But while this is the reply to the

question submitted, your committee ask leave to go a little further and state that, from the observation of its several members, a belief is entertained that most farmers of the state, who hope for success, seem to expect it to come to them not only without careful attention to their especial business, but with their attention divided and distracted by everything and anything outside of their farms which comes under their notice; and they continually suffer these outside things to infringe upon the time which they, as reasonable men ought to devote to their farms.

Your committee do not here intend to reflect upon the ability, nor general intelligence, nor shrewdness of the farmers of the state; for it is believed that most farmers, although they may hope for sucess, have but little faith in its attending their farming operations; which appears to be manifested by the great readiness with which they seize upon weak promises of pay elsewhere; by their almost universal neglect of the farm when they have capital to invest; by the little interest they take in studying up the best methods of doing all the different kinds of farm work, when compared with what they manifest in any speculative scheme, or in the political movements or wire pulling of the day; by their want of zeal in their own cause and their evident general disinclination to go into it with their heart and their strength; and their unwillingness to seek scientific knowledge from the matured reasoning and practice of minds leading in the direction they ought to pursue. It has suggested itself to the minds of your committee to delineate, each one for himself, from his own personal observation in those farming communities where he is best acquainted with the actual condition of things, the picture presented by imagining the mechanics and manufacturers, the merchants, physicians, lawyers and clergy of Maine giving to their respective callings just the attention,—and no more,—that the farmers of Maine give to their calling: the merchant confining himself to the limited custom of his own town, and thinking only of turning the odd half and quarter cent to his way of the trade; the manufacturer constantly neglecting to allow his, or another's invention to aid him to new machinery; the minister of the Gospel refusing to study any works of others because he might thus be accused of obtaining his ideas from books; the mechanic working on by hand as his father worked and scorning steam as a motive power; the

lawyer practicing only upon decisions of his own court and contenting himself with, what is now called, the dirty work of his profession; the physician unheeding all ancient and modern discoveries of his science and practicing upon the prescriptions of his sire. And this picture resolved itself into a series of dissolving views representing listless men at slovenly work upon badly proportioned, ill designed structures of all sorts and kinds; useless fabrics in unsaleable heaps with a confused medley of charlatans, quacks, pettifoggers and pulpit politicians. And then from these depressing views, the minds of your committee, acting and reacting upon each others thoughts, came back to the real life of today and observed and reflected upon the position in society which these lawyers, doctors, ministers, merchants, manufacturers and mechanics really do hold, and it seemed to be very clear that their success was owing to their constant and undivided attention to their business; to their true faith in it, and towards it; to their instantly seizing upon every means and appliance to onward progress; to their determination to fathom and put in requisition every resource within their reach. And reflecting still that the very existence of these lofty lords of society depends entirely upon these lowly tillers of the earth, with all the want of earnest undivided attention which the farmers of today yield to their avocation—the grandest art and profession of all, because the most important of all. Your committee feel impelled to urge upon those who, by farming, now accomplish so much and labor so little, to apply all their mental and physical energies to conducting the business of their farms; they should not only have a theoretical but a practical knowledge of the best modes of raising and feeding live stock, making and applying manure, draining and tilling the ground, and of the plants best adapted to the different kinds of soil, and they should give close, earnest, *zealous* personal attention to their business; and acquiring faith in their own peculiar occupation show faith in works, and so make their own success and consequent promotion sure.

JOHN F. ANDERSON,
E. L. HAMMOND,
E. B. STACKPOLE,
} *Committee.*

This report elicited a somewhat animated discussion. The secretary remarked, that for some years past he had seen and conversed

with many farmers in all parts of the state, and unless those he met were more active, intelligent and progressive than the average, he deemed the picture too darkly drawn.

Mr. Hammatt could not agree with the report; he had known as lazy lawyers and men of other professions. He repudiated the idea that farmers could not have any of the luxuries of life without ruining themselves. Live, active, intelligent farmers in Maine, can secure for themselves and families the comforts and luxuries of life, as easily as any other class of men. What are their fine horses and carriages but luxuries, which few other professions can enjoy? Can the great body of mechanics do any such thing?

Lumbermen have to work night and day to get a living. Farmers can get a living with as little wear and tear as the merchant or any other class.

There is a growing interest in farming, and in all that pertains to agriculture. Our farmers are anxious to come in competition with others, and secure success above their fellows, and new attention is secured to this business all over the state, and I cannot think it is wise to report that farmers are inattentive or uninterested in their business; I hope the committee will modify their report.

Mr. Davis said that in the portions of the state with which he was acquainted, there was altogether a better feeling, and a higher estimate of farming and of the value of farms than formerly.

He could hardly assent to the report.

Dr. True thought the chairman had not taken exactly the right view of this matter. He might have said, with perfect truth, that the majority of farmers do not work over two hundred days in a year, and yet they live as well as any other class. Merchants have to work early and late to get a living, while farmers are at a show and spending, instead of earning money.

Mr. Flint thought if farmers sought only the substantial good of life, they could secure it with only so much labor as was necessary to health. There is no need of delving with that intensity which was needed in other employments. But when farmers undertook to go into the fancies, and luxuries, and follies of artificial life, they always found them a load they could not carry.

Mr. Hammatt could not agree with the gentleman from Somerset,

that farmers must deny themselves all the luxuries of life. That gentleman does not do this. He eats as good food, drinks as good *water*, rides as good a horse, drives as good a carriage as he pleases. Other farmers can do this if they choose, as well as he, and not over-work themselves either, by laboring no more than is compatible with health. I do not believe that it is necessary for farmers to deny themselves all luxuries to secure success. It rather requires zeal and energy and thought and persistency, to ensure the highest success.

Mr. Cushman thought the term lazy could hardly be applied to farmers, merely because they did not work as many hours or as many days as men engaged in other professions and employments. There is no necessity for their doing this. They could carry on their business successfully without it.

Mr. Anderson defended his position. He thought no good could come of trying to cover up and smooth over the thing. The only way to remedy the evil and make progress, is to probe the sore to the bottom and ascertain its real nature, then a successful remedy could be applied. It is useless to deny that there is a want of faith in their profession on the part of farmers. We may as well tell the whole truth, for it cannot be concealed that farmers do not enter into their business with that zeal and real energy we see in other professions. They do not toil with the persistency that marks the successful merchant and artizan, nor do they invest capital when they have it, with that freeness and confidence which is shown in other sorts of business. When farmers come to have faith in their business, work every day in it as do men engaged in other occupations, apply capital in its prosecution, study the best method of using labor, capital and manure, and pursue it with the same energy and zeal, the march of improvement will go forward with a speed not yet attained.

One other thing is also needful; they should have more self respect—as it is, they think too little of themselves. They often act as if they were inferior to others. If men as individuals or classes would be respected, they must first respect themselves.

Mr. Hammond approved of the report. He understood it to say that farmers must confine their attention to their farming; not divide

it with other employments, but give to it both their undivided energies and their capital, and that until this was done, the highest success could not be secured. In this view he most fully coincided.

Mr. Porter agreed with the report. It *is* true that many of our farmers are not so industrious, energetic and persevering as they ought to be, and both themselves and their farms bear the mark of their shiftlessness, as plainly as Cain bore his mark. It is useless to think that farmers can succeed in their business, any more than others, without intelligence, energy and enterprise. What is most wanted among our farmers to bring them up to the mark, and wipe out the mark of inferiority, is faith, force, energy and activity.

After some further remarks the report was adopted.

Mr. Wasson, for committee on fourth Topic, made a report in which the great necessity of a geological survey of the state was fully admitted and its importance forcibly set forth, but concluded with the recommendation that the Board do not urge it at this time, believing that in the present low condition of the finances of the state, the attempt would be futile and perhaps prejudice future action. The report was accepted and laid on the table.

The next day Mr. Anderson moved a reconsideration of the vote whereby it was accepted, and that it be recommitted with instructions. He said it was made the explicit duty of this Board, by the act establishing the same, *to investigate* all subjects pertaining to agriculture, and *to make such recommendations* and suggestions as its interests required.

Mr. Flint was in favor of the survey, but was afraid that those who do not see the necessity of it might be prejudiced against the Board, and therefore thought it not best to urge it at present.

Mr. Wasson prized a geological and agricultural survey as much as any one could. He admitted that the demand came from every part of the state. But any effort to obtain it now, is futile. Ever since 1834, attempts had been made, and yet little had been done. Such is the low condition of the finances of the state, that although we ought to have the survey, we know in all probability what the answer will be, and therefore we ought not to ask it.

Mr. Hammatt took a different view. It is our duty to recommend to the legislature what we fully believe will conduce to the highest agricultural welfare in the state. It is the province of the legisla-

ture in deciding upon the expediency of adopting what we recommend, to consider the condition of the treasury.

Dr. True remarked, that the topic under consideration involves principles that are difficult to discuss so as to convince the unconvinced. It is difficult to point out specifically the benefits that would arise from a geological survey of the state. Public sentiment has, for many years, felt that it should be done; but various causes have served to prevent its completion.

Massachusetts, New York, and other states have adopted the policy of developing their natural resources, and are now reaping an abundant harvest. New York alone has expended well nigh half a million of dollars to complete the survey of her territory; in this respect, perhaps, she as a state, stands foremost in the world.

There are many unsettled questions which geologists have referred to a complete survey of Maine for a solution. Every river from the St. Croix to the Piscataqua needs to have its history recorded. Its soils, its muck beds, its marine manures, its rocks, its minerals, its fossils, its mines, its quarries of slate and lime and marble, its forest lands, all need the scrutinizing eye of the mineralogist, the chemist, and the geologist. The quarries of marble and slate which are so valuable to Vermont, on recent investigation are found to extend over into northern Maine, Not a foot of soil on our territory is unworthy the investigation of the man of science.

Then there is a negative influence which is of no little value. The excitable and visionary man is deterred from carrying out schemes which he has laid, in violation of the well known laws of nature. Men will not be left to hunt for gold where there is none. Some secret nook in yonder mountain will no longer be reported as the place where a mass of gold or silver was found but never made known. Pyrites will not be mistaken for the precious metal, nor tourmaline for coal. Men will not then dig into solid granite for coal, because the geologist tells them better.

I have no doubt the labors of the Board of Agriculture, and especially the survey of our secretary in Aroostook in 1857, saved to the state last year a million of dollars worth of men and capital. It might cost five thousand dollars to continue the geological survey of the state, but I believe that for every one thousand dollars expended in this way, there will be a saving of one million of dollars,

in men and capital. Nor is this a mere matter of belief. It can be demonstrated by the safest rules of sound political economy which time will not allow here to present.

I am aware, that retrenchment is the order of the day, and I would go for that as heartily as any other man, but as one would arrest the falling of his whole house by setting beneath it a single prop, so may we, by a little attention to the wants of our body politic, place it on a firmer and broader basis than ever before It is for the interest of the whole state that it should be done. He had no doubt that an appropriation could be obtained,—men's views have changed on this subject, and those who a few years ago opposed it, now advocate it.

The secretary here stated that in 1855, a resolve passed the legislature authorizing a continuation of the survey, but it failed because of a requirement incorporated into the resolve, that at least two specimens of soil in each town should be analysed; a requirement at once useless and fatal. The cost of so many analyses would be greater than the appropriation, and had this not been required analyses would, as a matter of course, have been made in all cases where they appeared necessary.

Mr. Bailey dissented from the conclusions of the report. He thought we ought to urge this measure, and *now*. The declarations of the report as to the necessity of the survey demanded that it should be forthwith done. Nothing else is of so much consequence to agriculture. The state now does not produce one-tenth of what might be raised. Suppose it costs ten thousand dollars to make the survey, what is that, if by expending it we can produce a hundred times as much? It is wasteful to delay it longer. It would be the most profitable investment that could be made, and this Board owes it to the interest it represents, to ask of the legislature an appropriation to make the survey.

After some further discussion the report was recommitted, and subsequently reported and adopted, as follows:

The committee to whom was recommitted with instructions, the following topic:—Is it advisable to recommend a completion of the geological and agricultural survey, report:

That in this "age of progress," few can doubt that the actual state of the country with its available resources, the origin and

composition of soils, can only be developed by geological research, and that a geological and agricultural survey would be one of the best investments ever made.

The importance of such a survey will suggest itself on a moment's consideration, its object being to ascertain the mineral wealth of the country, the fertility and capabilities of its soil, and consequently its value as a public or private possession, and it is only by invoking the "hand of science" that such information can be obtained. It is a well settled principle in theory, and better established in practice, that agriculture, which draws largely on the science of geology —lies at the foundation of all national wealth and strength, and any state or people that will encourage this necessary and advantageous pursuit, is on the highway to prosperity. In view of these facts and believing that the interests of agriculture in common with all the industrial interests of the state, demand a thorough geological exploration and agricultural survey, we would recommend a completion of the same.

S. WASSON,
S. DILL,
A. CUSHMAN, } *Committee.*

The committee on the fifth Topic, asked leave to report after the close of the session to the secretary, which was granted.

Mr. Hammatt, for committee on sixth Topic, submitted the following report:

It would seem by the wording of the question propounded, that to the turnip crop is awarded in the mind of the questioner the great benefits which have been derived by the agricultural interest in England from their system of rotation of crops.

The systems of rotation of crops in England being such as to yield largely of grain and very little hay, compared with the practice in New England, necessarily involve the adoption, for general cultivation, of some crop which shall answer the purpose of winter food for stock; and as the farmers and stock growers feed hay to their animals to a very limited extent, they have adopted the turnip as the cheapest and best substitute for it, and, it is presumed that under the circumstances, considering that they make up, with a very small amount of hay or straw, the whole diet of these animals, —it is the best variety of the root crop they can use. But in this

state, where grass is our principal and cheapest forage crop, it seems to us, that we should rather endeavor to produce and preserve for winter use a sufficiency of roots to furnish a desirable change and variety of food for our animals during the winter months, and to enable us to use advantageously much rough fodder in place of good hay, which could thus be greatly economised.

Inasmuch as the turnip crop in England is relied upon as the principal food for sheep during the winter, taking the place, almost entirely, of the various kinds of fodder and grain which in this state we are obliged to supply to our stock, our answer might very properly begin and end with the simple but emphatic word, none! But presuming that the Board did not expect or desire quite so short a reply, we will venture to express very briefly, our opinion, based upon our own experience and observation, that the turnip, however extensively cultivated in this state, would not "yield similar advantages" to the agricultural interests that it has in England. Neither would the cultivation of any one of the different varieties of vegetables, however extensively it might be adopted by the farmers of Maine. No root crop can in our climate be made to constitute, advantageously, so large a proportion of the winter food of sheep and neat stock, as does the turnip in England.

We can, perhaps, produce nearly as heavy crops and of quite as good quality as are produced there, it is, however, almost impossible to secure from frost the requisite quantity to support a large stock of sheep and cattle through our six months of winter, but notwithstanding the presumed impossibility of gaining the whole point, may we not by adopting more extensively the cultivation of turnips, beets and carrots, approximate very nearly to it?

The turnip, in our climate, may generally be raised in large quantities, at less cost than any other root crop, but it is more liable to injury from insects, and is of less value as food for stock than either the mangold-wurzel or carrot.

The mangold-wurzel we esteem the most valuable of the roots referred to, on account of its certainty, with proper cultivation, to yield a large crop, and of its nutritive properties, equal to either the others. It keeps well, and is not, so far as our observation extends, liable to the attacks of insects or vermin in its early growth.

Carrots, too, may be produced, sometimes, in great quantities and at low cost, but our experience in their cultivation and consumption, has led to the conviction, that the mangold-wurzel is better adapted to our climate, and to the present manner of prosecuting our agricultural operations.

Upon the whole we cannot refrain from expressing the opinion, that the interests of the farmers of Maine would be very much promoted by a more extensive cultivation of root crops, as winter food for stock. A liberal supply of turnips, beets or carrots, during the winter, is sure to bring our stock out in the spring in good health and flesh, so that when they are turned to pasture, they are in a condition to receive that benefit from the young grass which it is intended by nature to yield, instead of wasting the earliest and best part of the pasturing season in recruiting their health and strength, which have been wasted and prostrated during winter in the vain endeavor to "hold their own" upon poor hay and straw.

WILLIAM C. HAMMATT,
ALBERT NOYES,
JOHN F. ANDERSON, } *Committee.*

Mr. True remarked, that we had a wide diversity of soils in Maine, and one kind would prove better in one locality and another in a different soil. In Aroostook and York counties, differences of soil and climate are very great. The clays of Cumberland county hardly exist in Oxford. Consequently widely different methods of cultivation must prevail.

It must also be borne in mind, that we have had three unusually wet summers in succession. We may soon have a series of dry summers which will dampen the arder of strong advocates of root culture. He had found the Norfolk white and purple strap leaf turnips among the best varieties.

His father once had a piece of land where the soil had been washed in to the depth of some four feet. This land he planted to parsnips. When he took off the crop he weighed it, and found its produce was equal to forty-two tons to the acre. The parsnip requires a very deep soil, and on rich soil they are very productive.

Mr. Porter said the turnip crop was very important, not merely on account of its value for stock, but as an agent to improve the soil. He did not think there was any substitute for this root for

such a purpose. It left the soil where it grew in the best possible condition for subsequent crops.

Mr. Dill said he knew farmers who would not use turnips for their stock if they could be had for nothing. As for himself he liked them, but cattle fed with them were more likely to suffer from cold, unless in warm barns, than if fed on hay alone.

Mr. Drummond said a neighbor raised fifteen hundred bushels of turnips, gave them to the cattle and they were in no better, if so good, condition as those without roots. I feed hogs as well as neat stock on turnips raw. I feed one-half of the winter on turnips and the other half on mangold. My neighbor gave too much of them to his cattle which was the cause of difference between his and mine —his suffering loss, and mine gaining.

Mr. Tucker said his neighbors fed their hogs on turnips and they did well. I feed my horses with carrots and oats, and consider they do better than on twice the quantity of oats alone. My usual feed is six quarts of oats and the same amount of carrots, and I never found horses do better.

Mr. Palmer said he thought very highly of carrots for horses and to fatten hogs. They were better cooked than raw. Carrots and pumpkins boiled together will fatten hogs cheaper than anything else. He had raised at the rate of upwards of fifteen hundred bushels of carrots to the acre. Turnips are colder than carrots. If you fill one half of a bin with turnips and the other half with carrots, the turnips will freeze solid, while the carrots will not freeze at all. Nothing will fatten a horse so quick as boiled carrots.

Mr. Martin had raised at the rate of three hundred dollars worth of carrots to the acre. The year following sowed to carrots again, but the seed failed to germinate. Ploughed up and sowed turnips broadcast the ninth of July, and had an immense crop. But he should have preferred to have his carrots succeed, because he thought them better for animals than turnips.

He had fed carrots to horses and other animals, and was entirely satisfied with the result. He considered a bushel of carrots equal in value to half a bushel of oats. But animals fed on roots should be kept in warm stables, or the results will not be so satisfactory.

Mr. Lancaster thought very highly of roots and had been particularly successful with turnips, manuring about the same as for pota-

toes. A good crop is from five hundred to six hundred bushels to the acre, but I sometimes get from eight hundred to nine hundred bushels.

Last year I ploughed up my ground in the fall. In the spring ploughed again, spread on manure and harrowed it in. Sowed the seed between the twelfth and twentieth of June. When up, I sowed on guano mixed with plaster, broadcast, and cultivated it in, at the rate of one hundred and fifty pounds per acre. I find planting on ridges the best, especially if the land is wet. I am now feeding my sheep on straw and turnips, and they look as well as those fed on hay without turnips. With us, turnips do better than mangolds.

Mr. Flint said he was troubled with the rutabagas rotting in the field. He had the same trouble with the green globe turnip, more than half of which rotted in the field. He did not think it strange that differences of opinion should exist as to the various kinds of root crops, for we have much yet to learn, both as to their culture and comparative value with other articles of food.

Mr. Hammatt strongly urged the mangold for late feeding. He never saw an animal that would not eat them, though he had known animals to dislike them a little at first. Very large crops could be grown and without so much labor as for other roots. They look feeble at first but soon grow vigorously and yield abundantly.

Mr. Cushman had tried beets, carrots and turnips, and gave a decided preference to carrots. He was desirous of learning the comparative value of roots and hay.

The Secretary said, it was not easy to give an exact answer to this inquiry. So far as the simple amount of nutritive matter which roots contain, is concerned, it could not be rated at over a quarter or a third as much as good hay, and if used as the principal article of food we must reckon chiefly according to this, but when fed in smaller quantities as an auxilliary to hay and coarser fodder we receive benefit not only from the nutritive matter they contain but from the assistance they render in the digestion and assimilation of other articles of food. So great is this, that to the extent necessary for this purpose they are probably fully equal, pound for pound, to good hay. Carrots contained a trifle the most of nutritive matter, beets about the same, say twelve to thirteen per cent; Swedish

turnips ten to eleven per cent.; English turnips nine to nine and one-half per cent.

Mr. Goodale further remarked, that although he proposed this topic for consideration, he did by no means maintain that the extensive culture of the turnip would accomplish for us what it had done for England. We were differently situated. Our climate was very unlike theirs. In England many roots were left in the field for consumption where they grew, and when harvested, a comparatively slight protection would suffice to protect them from the frosts of winter—here all must be secured in root cellars; and yet he believed that the culture of roots promised well enough with us to warrant its increase a hundred fold. In the state at large they had been sadly neglected—totally neglected, (if we except the potato, by a majority of farmers,) as a *field crop.*

When we grow as many acres as we now do rods, we may approximate the right proportion. The value of roots is not comprised in a single item. Their cultivation is the best preparation of soil for other crops They yield a very large amount of nutritive matter. By their help we can sustain more cattle and sheep, and can also give them such a variety of food as will cause them to thrive better than when confined to dry fodder, however good it be.

The stock thus fed will in turn so increase the supply of manure that we can grow heavy crops of grain and not be dependent upon other states for bread stuffs.

Perhaps no single crop will ever be to us just what the turnip is to England, but I am not sure that roots and Indian corn together may not. My estimate of Indian corn is very high. I think it well entitled to be called, as it has been, "meal, meadow and manure," and sometimes am inclined to look upon the extent and style of its culture, at least in the southern half of the state, as a fair index to the condition of agriculture among us.

As to the root to be preferred, he would not decide dogmatically, nor confine himself to one, to the exclusion of others, each farmer should decide according to his soil and other circumstances. Each root has its advantages and disadvantages. The mangold would thrive in a heavier soil than suited the carrot or turnip. The parsnip could remain in the ground all winter. The turnip was liable to the fly and the carrot to rust The turnip was best in early

winter and became corky if kept late. The mangold was best if fed out after midwinter and if given early would cause scouring. His object in presenting the topic was simply to get at the facts of experience and invite attention to the importance of extended root culture.

The report was adopted.

Mr. Rice, from the committee on seventh Topic, presented the following report:

Ought the Board of Agriculture to be empowered by law to fix the time of holding the shows of agricultural societies?

In discussing the question under consideration, your committee perceive two objects, the attainment of which is aimed at in instituting the above inquiry.

1st. The making our county societies more effectually auxiliary to the state society by having all the exhibitions of the former precede that of the latter,—that choice specimens exhibited at the county shows might be selected for exhibition at the fair of the state society.

2d. It is desirable that an arrangement be made by which no two contiguous societies should hold their fairs at the same time, thereby exciting a negative influence on each other and to a greater or less extent neutralizing the beneficial results of both.

In considering the first of these propositions your committee feel that however desirable in itself, the accomplishment of the object is attended with paramount difficulties;

For instance, if the county societies are required to hold their fairs at a much earlier day than heretofore, farmers will not have gathered in their crops, and of course will be unprepared to exhibit. On the contrary, if the state society be required to defer its exhibition to a later period, there is reason to apprehend unfavorable weather and a bad state of roads; thereby reducing the attendance and proportionately diminishing the influence and benefits of the exhibition.

Your committee would therefore suggest that this Board, instead of asking to be vested with additional power in this matter, simply recommend to the several societies throughout the state, that they strive to promote the interest of the state fair, both by their personal attendance, and by forwarding specimens of their productions for

exhibition; and that the trustees of the several societies be requested in fixing the time of their fairs to consult the officers of contiguous societies, and so far as practicable, so to arrange them that they shall not conflict with each other.

F. L. RICE, *Chairman.*

The report was adopted.

The committee on eighth Topic, reported as follows:

The committee charged to inquire "what proportion of the funds of agricultural societies, if any, should be expended in promoting general or permanent farm improvements?" report:

That while the plan now in common use, of awarding premiums on animals, vegetable products, implements and articles, shown at our fairs, has been productive of much good, and ought by no means to be discontinued, they yet believe that by this plan only a small portion of the great field of improvement which is open to the farmers of Maine, receives any direct or sufficient encouragement or stimulus. We believe the time has come when our societies should commence a new line of effort, aiming at greater and more important results, although, doubtless, making less display at our annual exhibitions.

It is far easier to bestow careful treatment and liberal feeding or manuring upon an animal or a crop, so as to secure the highest prizes awarded for such, than it is to bring up to a similar standard of excellence all the stock and all the crops of the farm; easier far, than to arrange the whole farm, its buildings, fences, and all else which pertains to it, in the best possible order, and to put the whole in the best condition. And your committee feel confident that the latter *should be the aim* of every farmer, rather than a single great crop, or a wonderfully fine animal.

Some feeble efforts have been attempted of this sort, by many of our societies, but experience has fully shown that the small premiums offered of five, ten, or fifteen dollars "for the best managed farm," have failed of accomplishing much good.

But where large prospective prizes have been offered for the greatest improvement to be made during a series of years, the happiest results have followed. As an instance in point, we refer to what has recently taken place in Cumberland county, from the offer two or three years of one prize of one hundred dollars, and a second

of fifty dollars, for the greatest improvements to be made in two years.

What have been the results? The highly intelligent committee who went, each year, over the whole ground, in their report, speak not only of the *earnest, ardent efforts* of some fifteen or twenty competitors, for the greatest improvement in their power, but of "the deep interest manifested by those *whose farms were not entered*, to see, and discuss the economy of the improvements made, and in many instances to commence the work of reform upon their own premises; giving evidence that this class of premiums is about to accomplish an amount of good to the agriculture of the county, not easily to be estimated. It is truly gratifying to observe the spirit of inquiry everywhere manifested, as to the best methods of conducting farm operations. The old ruts in which the fathers teamed so sturdily and persistently, are being carefully examined: and, though perhaps they were well adapted to the circumstances of those who marked them out. they are now often found too deep and heavy, too hilly and circuitous for these latter times. Improvement is now the order of the day; improved stock, improved buildings, improved implements, improved orchards, gardens, mowing, pastures, *improved everything*. Men of intelligence, energy and perseverance, and with abundant capital, are enlisting in it, and, if we mistake not the signs of the times, farming in Cumberland county is soon to assume a rank, as an occupation, second to no other, either in point of the skill with which it is conducted, or the profits which it will be made to return."

What has come to pass in Cumberland, may be safely calculated upon wherever a similar movement is started in other counties, and the actual benefit accruing to the agricultural community, will, in the opinion of your committee, be many fold greater and more lasting, than by expending the same sum in prizes upon extra fine productions, brought to the fair; leaving behind upon the farm, possibly, many things which the owner would be less anxious to have properly appreciated by a discriminating committee.

But we are met by the objection that many of our agricultural societies are not able to devote the requisite amount for this purpose, without great inconvenience or sacrifice; perhaps, would be obliged to suspend their ordinary operations for a year, in order to do it.

Without expressing an opinion whether this would be advisable or not, we beg to make a suggestion, viz: let ten, twenty, or thirty per cent. of the required sum (according to circumstances,) be laid aside from the usual expenditure, for this special purpose, and be put at interest; meantime, agitate the subject, awaken an interest in it, and at the proper time announce the prizes and allow not less than three years, perhaps four or five, in which to accomplish the improvements.

Another objection may be made,—that it will cost something for a committee to visit all the competitors, and examine carefully their operations,—to note down year by year the changes taking place on each farm, and to compare results.

We answer, very true,—but is it not worth something to visit all the go-ahead farmers, and to have the opportunity of examining, and criticising, and comparing, and profiting by what can be seen and learned in such a trip? Farmers suffer much by isolation, by the lack of opportunity of visiting and examining each other's sphere of operations. They meet at church, and occasionally at market. What they need is to meet oftener *in their factories, and beside their machinery while it is running.* Now, we say that placing a man on such a committee, is putting him into a better agricultural school than can be found elsewhere in all New England, and if he deduct fair tuition fees from the needful expense, there will not be a frightful sum remaining to be provided for otherwise.

Respectfully submitted.

SEWARD DILL,
S. L. GOODALE,
HIRAM STEVENS,
Committee.

The committees on ninth and eleventh Topics, asked leave to report after the session, which was granted.

Mr. Hammond, for committee on tenth Topic, read a report, which was, after discussion, recommitted with leave to report at the next session,

Mr. Noyes, from the committee on Topic No. 12, made a report, as follows:

Can the cultivation of the smaller fruits be made profitable? If so, what varieties are best, and what are the best methods of cultivation?

Your committee to whom was assigned the above topic, would ask leave to report.

We are of opinion, that the cultivation of the smaller fruits is altogether too much neglected. Whether this neglect arises from the false impression that there are no dollars and cents to be seen, or from a want of reliable information as to the best kinds and method of cultivation, your committee are not prepared to say; but certain it is, when this important branch of horticulture has been attempted on a somewhat extensive scale, it has invariably been attended with profit, not only to the pocket directly, but in the perceptible health of the household. Take for instance the currant, the smallest of the small fruits, and see to what a variety of useful purposes it can be made subservient, and the ease and facility with which it can be grown, adapting itself to all soils, and never disappointing in a crop. The same may be said of the cooling and refreshing raspberry—several varieties of which are of magnificent size and exquisite flavor, which have more recently been introduced, and which command good prices in our markets, and which can be grown in large quantities on a small piece of ground.

Your committee regret not having any data at hand, by which to give a more full and reliable account of the profits arising from, and the best methods of cultivating the smaller fruits in general. And they would suggest the propriety of assigning this important subject to a committee of one or more, whose duty it should be to gather facts and prepare a statement for publication in the secretary's next annual report.

Respectfully submitted.

ALBERT NOYES.

The report was accepted, and in accordance with the suggestion at its close, Mr. Noyes was charged with the preparation of the statement for publication.

Mr. Stevens, for the committee on thirteenth Topic, read a report, which, after some discussion and slight verbal amendments, was adopted, as follows:

By what means can the settlement of the new and fertile lands of Maine best be secured?

This is an important question—important alike to every citizen of the state, and involves in its answer the future greatness and pros-

perity of the commonwealth, because it involves the unfolding and development of its immense internal resources now lying dormant and unknown. The settlement of the new and fertile lands of Maine therefore interests alike the farmer, the artisan, the merchant and the professional men of the state—and directly and indirectly affects their prosperity as individuals, as well as a body politic.

Among the means to be adopted to secure this great end, we answer,—first, better facilities of communication with the older parts of the state,—thus enabling us to retain all its trade and its business within our own borders—and affording our citizens a quick and economical mode of reaching those lands, there to hew out for themselves farms in the wilderness.

Secondly, by keeping before the people the capabilities and resources of this region, which has until quite recently been an unknown world to most of our people. There are various ways of doing this.

By the partial geological and agricultural survey of the state much kuowledge was disseminated. And if this survey could be completed, and a knowledge of the agricultural capabilities of our wild lands be placed before the public eye, it would be a prominent means to bring about the object under consideration.

The land agent's circular has been instrumental in directing the attention of the people to these lands, and more especially the existence of a Board of Agriculture, in connection with the energetic and well-timed labors of its secretary, who, in the summer of 1857, traveled through Aroostook county for the purpose of learning something of its agricultural capabilities and resources. This information has been disseminated throughout the state by means of his annual report at once, and has been effectual in calling the attention of the great mass of the people to the fertile land of northern Maine. For the past year, much knowledge of Aroostook county has been disseminated through the columns of the Aroostook Pioneer, a weekly paper printed in the very heart of the public lands. This press ought to be liberally supported by the people of the state, whose best interests it has done and is still doing, so much to advance.

HIRAM STEVENS,
ALFRED CUSHMAN,
SEWARD DILL,
} *Committee.*

Mr. Tucker, for committee on fourteenth Topic, reported as follows;

"What breeds and classes of horses are most deserving attention and encouragement in Maine, and what is the best mode of rearing and training them?"

Your committee do not expect in this brief report to meet the views of the members of this board or of others that are engaged in raising horses; all have their favorite breeds. Neither does your committee expect to be able to give you a particular description or history of all the valuable breeds of horses that there are even in New England. There is perhaps no animal on which there is more difference of opinion than on the horse. The Morgan horse has been reared with success and is a hardy animal; his constitution is adapted to our climate. The Morgan combines all that seems necessary to make a good horse, being of medium size and powerful action, good feeders, possessing docility of disposition and mature at an early age. Your committee would here meet an objection often made against the Morgans, that they lack in size. There would be no difficulty in increasing the size of the Morgans, but when we have increased their size shall we have the Morgan horse? What we have gained in size we have lost in symmetry, compactness, ease of motion and vigor. The question of size is of great importance in breeding, aud one in regard to which breeders are very liable to mistake. Committees and agricultural societies often encourage erroneous opinions on the subject; a large colt is likely to get a premium, all are not critical judges, and under a load of fat, but few are capable of pointing out the defects in the animal. Every departure from the medium size of a race of animals is attended with a loss of power and action, and a departure from the medium size should not be permitted except for a special purpose.

The Messenger horses have been reared quite extensively and with great profit to many farmers in Maine, who have had the pleasure of filling their pockets with the hard cash—the proceeds of the sale of a fine Messenger. The Messengers do not mature as young as the Morgans, being of much larger size, but when matured, they are capable of great endurance, and are usually of good disposition. A great number of the Morgans and Messengers have proved to be fast trotters.

There are many other breeds of horses that are entitled to honorable mention. The Black Hawks are not second to any breed. They make fine carriage and saddle horses, and for style and action are unsurpassed. Are very fine limbed and active, being a branch of the family of Morgan horses they partake largely of the vigor of the Morgans. The Hamiltonians and Eaton horses have gained celebrity, and are the favorites of many, being of the Messenger family; that is enough to recommend them. The Indian Chiefs, Drews, and Fox horses, all have their admirers, and some of them have created quite a sensation among the horse fanciers.

Your committee hardly feel competent to decide which or what breeds of horses should be most encouraged in Maine. Without doubt, more profit has been realized from the Morgans and Messengers than from any other breeds. One very important point in raising horses is to propagate from the most pure blood to be found, of whatever breed you may wish to raise.

The classes of horses to be considered are: 1st. The stock horse. 2d. The brood mare. 3d. The family carriage horse. 4th. The roadster. 5th. The trotter. 6th. The farm or draught horse. 7th. The racer. Your committee will be able only to glance at the different classes. First is the stock horse, like begets like, and a good stock horse is indispensable in propagating good stock, and without him our effort to raise good horses could not be crowned with success. Second. A brood mare is very important, and good mares should be used for breeding. It is too much the practice with farmers, if they have a mare that is of no other use, to put her to breeding; that is a great mistake, and should be corrected. To raise a good colt, the sire and dam should be of good symmetry, and the practice of using a sire much larger than the dam is not usually attended with good results, the reverse would do better; to have them nearly equal in size would be most desirable. Third. The family carriage horse is almost one of the indispensables, but very few would be willing to be deprived of the services of this noble animal. A horse of this class should be trained to the saddle, as he is hardly a family horse unless he can be used under the saddle. He should also be of docile disposition, and great care should be observed in selecting a horse for this use. Fourth. A good roadster must have speed, bottom, life and ambition, and be a good feeder,

of good disposition and well broken. All combined, will make a good roadster. Fifth. The trotter. This class has its friends and its enemies. They have more enemies in words than in acts. When a trotting match comes off all are there. Those that have denounced it are there. All classes of citizens are represented. All are interested. Sixth. The farm and draught horse. This horse should be heavy. The services of this class cannot be dispensed with. With him we carry on our farm, haul our produce to market, and as he is coming into more general use upon the farm, he too, should receive attention. Seventh, and last, is the racer. But little is known of him in Maine, and in these days of traveling by steam, and communication by telegraph, our fast young men have not found any use for this class of horses.

The six classes first mentioned appear to be deserving of attention and encouragement in Maine. The rearing of horses is important and one that interests each member of this Board and every farmer in Maine. It is a subject that is too much neglected. In raising good horses it is very important to start right, and after starting right, do right. Those that have been most successful in raising good horses have worked their mares but very little, if any. If they are used, their treatment should be kind and not overworked; neither before nor after she drops her foal until it is weaned. Colts do as well weaned on hay. It is the practice of many to put them in stables to wean them; that is objectionable, it is injurious for them to stand on a hard floor. Colts do much better to run in a yard with a warm shelter to go into at their pleasure. They should have the best of care the first winter. A plenty of good hay and water with one quart of oats per day, will be sure to improve your colt, and he will come out looking finely in the spring.

Colts should not be neglected. After their first winter they should be kept growing. You cannot expect a good horse from a poor half-starved neglected colt. Colts will do better not to be stabled until three or four years old, unless the floor is well littered. A manure yard with a good shed to go under would be better, then they would get exercise which is conducive to health.

The proper training of horses is very much neglected. Many suppose when their young horse gets so that he will go in the road and haul a carriage he is well trained, or at least sufficiently so that

he will come to it in time. The reason that there are so many unpleasant driving horses is from the fact that they were not well trained to commence with. A young horse should be made acquainted with the bit and check rein, as it is customary with most persons to drive their horses on a check rein. The age most proper to commence to train a colt is to halter break him when you commence to wean him. Keep him acquainted with the halter ever after. The time to commence driving depends much upon the breed your horse is, and how near his maturity. Three years old is young enough to commence driving any young horse in harness, and then with but light loads. The great difficulty in training colts young is, that we are likely to use them too much. A good colt with good keeping and well trained will be very sure to make a good horse.

All of which is respectfully submitted.

J. D. TUCKER, *Chairman.*

Report accepted.

Mr. Fuller of the Kennebec society, stated that he had been instructed by the trustees of his society to request the Board to recommend that the legislature appropriate three hundred dollars annually to each of the agricultural societies in the state, and he accordingly offered a resolve to that effect, although his private opinion was adverse to its adoption.

Upon discussion by Messrs. Flint, Hammatt, Dill and others, the resolve was laid upon the table.

Mr. Anderson moved, that the following be added to the rules of order:

No member shall speak more than twice to the same question without first obtaining leave of the Board, unless he be the mover, proposer or introducer of the matter pending; in which case he shall be permitted to speak in reply, but not until every member choosing to speak, shall have spoken.

The motion was carried.

Mr. Noyes thought the Board had overlooked one department of agriculture. He alluded to the Honey Bee. He read a letter upon the subject from Mr. R. S. Torrey of Bangor, stating that the keeping of Honey Bees was a desirable and profitable department of farming, having this advantage, that it might be conducted by females in the family to whom it would prove a pleasing and profi-

table pursuit; that aged persons could attend to the bees when they could not walk over the farm to labor; that even children could assist in this department, and find agreeable occupation; that the keeping of the Honey Bee, especially in the northern counties, combined in an eminent degree both pleasure and profit, and served to mingle the useful with the sweet. The letter further stated the principle upon which was constructed the Davis' Patent Platform Bee Hive, with Torrey's Improvements, and recommended that the Board refer the whole subject to a committee for a full investigation.

Mr. Dill stated, that he had had considerable experience in the culture of bees. He had received the most profit from them kept in Colton's hive. He thought attention enough had not been paid to their cultivation.

A committee consisting of Mr. Noyes and Mr. Dill were raised to report at the next session of this Board.

Mr. Wasson called the particular attention of the Board to the paper of Hon. P. Barnes, on drainage, printed in the secretary's report. He thought it worthy of especial consideration and commendation, not only on account of its value, but of the circumstances of the case, and the source whence it originated. He therefore begged to offer the following resolution:

Resolved, That the secretary of the Board be instructed to present the thanks of the Board to Hon. Phineas Barnes for his valuable paper on drainage and flowage, published in the last report, and that the secretary be also instructed to present the draft of a law accompanying this report to the joint committee on agriculture of the present legislature, and urge the adoption of the same.

The resolution passed by a unanimous vote.

The secretary offered the following resolve, which was adopted:

Resolved, That in the opinion of this Board the adoption by the state of some thorough and efficient system by which reliable and extensive statistical information could be obtained and laid before the people, would greatly conduce to the prosperity of the commonwealth by developing our known and unknown, active and dormant resources, our facilities for all industrial pursuits, and by increasing our population, products, wealth and power.

The secretary was instructed to present the same to the appropriat committee of the legislature, and to urge favorable action thereon.

Specimens of seed corn were presented by Messrs. Dill and Flint, potatoes by Mr. Lancaster, and seeds of the Hubbard squash by the secretary, all of which were distributed among the members for trial.

Distribution of so many agricultural documents as were bound was made by a committee appointed for the purpose, and on motion of Mr. Hammatt, it was voted, that the further distribution of reports or other documents which are or may be within the control of the Board, be left to the discretion of the secretary.

It was also voted, that Messrs. Martin, Anderson and Goodale, be a committee to confer with the several agricultural societies in the state, and if practicable to arrange and announce the time for the several exhibitions of said societies; in accordance with the recommendation of this Board.

The following was also adopted:

Resolved, That the secretary of the Board with the advice of the president, be authorized to act in behalf of the Board, in any matters demanding action in the recess.

On motion of Mr. Dill, it was

Resolved, That each member select (before adjournment) one topic upon which to report to the secretary, on or before thirtieth of September next; and subsequently, another topic for discussion at the next session of the Board, upon which he will then present his views, either verbally or by written report, as he may prefer.

The topics selected to be investigated and reported upon as above, are as follows:

The soiling system: Calvin Chamberlain.

Clearing of new lands: Alfred Cushman.

Renovation of exhausted lands: E. L. Hammond.

Shelter cheaper than fodder: William R. Flint.

Marine manures: B. C. Bailey, Samuel Wasson.

Feeding of farm stock: Robert Martin, W. E. Drummond

Best breed of cattle for general use: Ashur Davis.

Horses: J. D. Tucker.

Loss arising from a surplus of horses: Seward Dill.

Profits of growing pork: William M. Palmer.

Potatoes and their culture: E. B. Stackpole.

Planting of orchards: Joseph Avery.

Culture of the smaller fruits: Albert Noyes.

How to make farming profitable: Hugh Porter.

Application of manures: Francis Fuller.

Facilities of northern Maine for stock growing: Hiram Stevens.

Culture of Indian Corn: Hiram Russ.

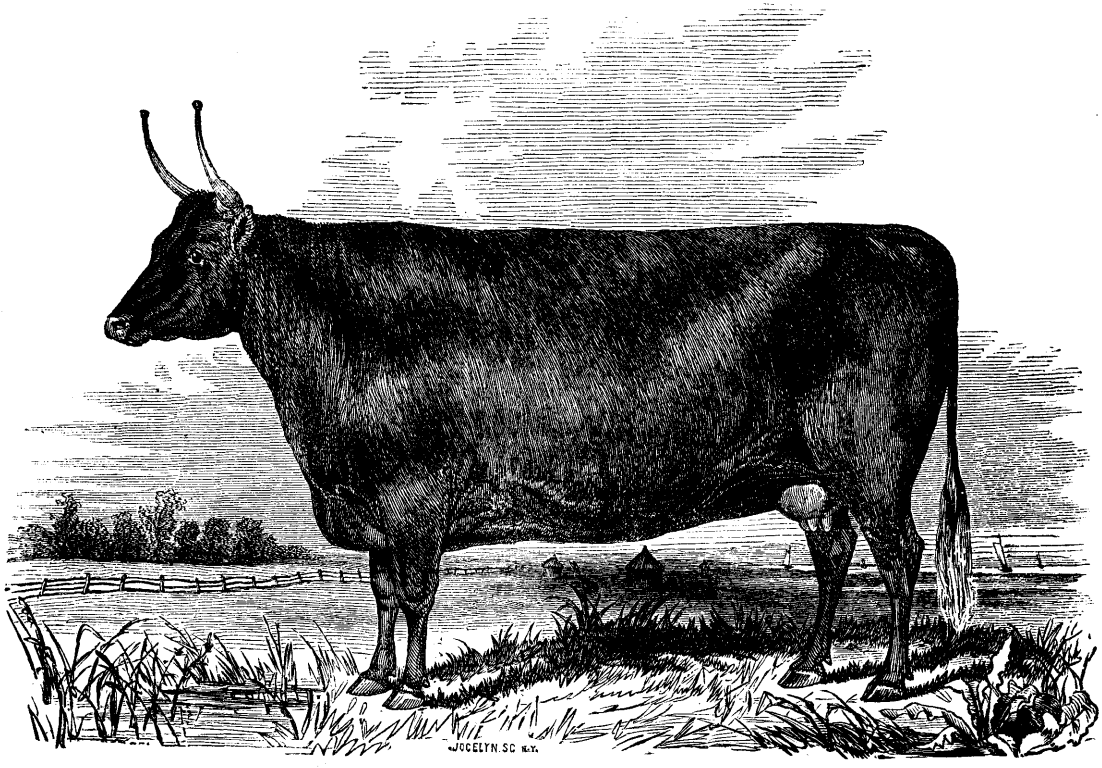
Renovation of old orchards: N. T. True.

Climate and soil of Maine in connection with Agriculture: Wm. C. Hammatt.

Sheep: J. F. Anderson.

Poultry: F. L. Rice.

After the passage of complimentary votes to the president and secretary, and to the reporters for the public press, the Board adjourned without day.



TITANIA.

1084.—Winner of the first prize in the two-year-old class of Devons, at the New York State Agricultural Show, at Elmira, 1855, and at the United States Agricultural Show, at Boston, 1855; and first at the show of the American Institute at New York, 1856, and second at the United States Agricultural Show, at Philadelphia, 1856. Imported and owned by Edward G. Faile, West Farms, Westchester Co., New York, and bred by George Turner, of Barton, near Exeter, England.

In order to the successful prosecution of any undertaking, and not less so in regard to agriculture than in other departments of business, it is needful that we have both a clear idea of the end to be attained and of the means best adapted to accomplish that end.

The ultimate end aimed at in agricultural operations is the production of *human* food, and this to the greatest amount practicable from a given area of land; but when we inquire as to the means by which the desired end may best be accomplished, we enter upon a subject, which in regard to its general outlines as well as in regard to details, has not received the degree of attention which its importance demands; and one upon which many farmers have no such clear views or well grounded opinions as are needful in order to direct their operations to a successful issue. If our soils were inexhaustable and all we get from them, year after year was so much clear gain, the answer could be given very briefly and easily—but so far is this from being the fact, that if we should attempt simply to sow grain and grow bread, we should soon find our lands barren and ourselves hungry and starving.

Experience has abundantly demonstrated that to grow *full* crops year after year, the land must be supplied with as much as it is deprived of in the crops taken off. If the whole of these were obtained from the soil, the whole would have to be returned to it, to make good the deprivation, but happily such is not the case. Only a part is thus obtained, and so, if we return such a part, we can live on as well as before, and if we return more to the soil than came from it, we can grow richer by adding to its original fertility.

Such is the lesson taught by the experience of all who ever tilled the soil, and yet until the pinch of necessity is actually felt, few have profited by it as they should. Instances are not wanting in the present generation where farmers in Maine have taken oats after oats from unmanured land to be sold for consumption in a logging swamp, until the crops were scarcely worth harvesting, and both the owner and his land sadly impoverished thereby.

If we look back to the first settlements of the country we find

the early colonists giving their attention chiefly to the growth of grain, their cattle being allowed to shift for themselves and left to subsist as they best could on the natural grasses, herbage and browse within their reach.

In subsequent years the sons of these same colonists in their progress westward have pursued much the same mode. After a period, varying with the natural fertility of the soil, but equally sure to come, whether at Plymouth or Jamestown, in the Genessee valley, in Ohio, or on the prairies farther west, the yield of grain is found seriously to diminish, insomuch that the inquiry is forced upon them, how shall we live? The same inquiry was long ago forced upon the attention of others. The problem has been satisfactorily solved and we may profit by their experience, if we will.

We are accustomed and with good reason too, to regard the agriculture of England as immensely in advance of ours, their average crops of grain being larger than our best ones grown upon virgin soils (except in rare instances) and some of their land so rich as to require two grain crops in succession to reduce it to a condition fit for the next crop in their rotation. But such was not always their condition. Less than three centuries since, Sir Hugh Platt, an agricultural writer of the sixteenth century, thus states his motive for undertaking to give instruction in husbandry. "What eie doth not pitty to see the great weeknes and decay of our ancient and common mother the earth, which now is grown so aged and stricken in years, and so wounded at the hart with the ploughmans goad, that she beginneth to faint under the husbandmans hand and groaneth for the decay of her natural balsam. For whose good health and recovery and for the better comfort of sundry simple and needy farmers of this land I have partly undertaken these strange labours, altogether abhorring from my profession, that they might both know and practise some further secrets in their husbandry for the better manuring of their leane and barren groundes with some new sorts of marle not yet knowne or not sufficiently regarded by the best experienced men of our daies." Seeing that he recommends hair, fish, malt dust, salt, ashes, the offal of slaughter-houses, &c. as among the useful fertilizers "not yet brought into any public use," it can hardly be wondered at that the land began "to faint under the husbandmans hand."

The first step to be taken in such case doubtless is to practice the utmost economy in regard to all fertilizing materials at command, but this, of itself alone, is insufficient; and another step is equally needful,—namely, to manufacture a greater amount of manure, and this we can do by reason of our facilities for growing abundant crops of grass. We can produce food for animals in larger quantities and with greater ease than we can grow human food, and this, *if consumed upon the farm* by cattle and sheep will yield beef and mutton, butter, cheese and wool—*and more*—for by its consumption we make *both meat and manure*, and we can sell the one and retain the other, so that, if the plan be judiciously carried out, each succeeding year will find both the amount which may be sold from the farm, and the ability of the farm to produce, steadily increasing.

We are so accustomed to a mixed husbandry and to the use of as much manure as can be had from the present small amount of stock kept, that this strain of remark may appear to many the utterance of self evident propositions and so entirely superfluous and unnecessary, but notwithstanding the fact, that scarcely a farm can be found in New England where more or less stock is not kept, the manure from which is almost the only reliance by which to enrich the land, there is reason to believe that very few comparatively among our farmers are conscious to the full extent and in all its force, of the connection which exists between the production of animal food and that of human food; nor is it easy, without extensive and minute statistical information, to present the same in its full force.

Unfortunately the value of such information has never been appreciated among our people, and consequently we have little in the way of statistics in this country to which to look, but in respect of other countries we are better supplied, and an examination of facts will abundantly show that such is the intimate and necessary connection between a stock husbandry and continuous and increasing fertility of soil, that it is safe to regard the degree of attention given to the culture of food for animals, as a certain index to the progress of agriculture, and this not in our own country only but in all northern countries of moderate natural fertility, (these being the only countries where agriculture has ever made any progress worth speaking of.)

The relative proportion of meadow and pasture land compared with the whole amount cultivated, appears to be in various countries as follows: in France one-fifth, in Germany one-fourth, in Great Britain three-fifths, in Holland five-sixths.

France, possessing a soil and climate naturally more favorable to success in agriculture than that of the British Isles, has one-fifth only devoted to meadow and pasture, while more than two-fifths are in cereal crops, but in Great Britain with three-fifths in meadow and pasture, only one-fifth is cropped with grain. Let us now look at the results of such widely differing systems of husbandry. In France upon one hundred and five millions of acres of cultivated land the annual production of meat amounts to eight hundred and eighty millions of pounds, or about eight and one-third pounds per acre, while in Great Britain, upon fifty millions of acres, the production is eleven hundred millions of pounds, or twenty-two pounds per acre. The grain crops of these countries also presents a contrast equally striking. In France the average production of grain, including wheat, rye, buckwheat and maize is only a fraction over twelve bushels per acre, while in Great Britain the average production of *wheat* (alone) amounts to twenty-eight bushels per acre. In the British islands the production of food for cattle is considerably greater than in the whole of France with twice the extent of surface, and the quantity of manure is proportionably three or four times greater, the yield of grain more than twice as great per acre, in quantity, and three times as much in money value.

In Holland, where nearly the whole surface is devoted to hay and pasture, land bears a higher value and commands a higher rent than in any other country.

The significance of such facts cannot be mistaken. They show plainly that an indirect course is not only the surest, but the only safe one, towards accomplishing the end of agriculture.

The prevalent husbandry of Maine is a mixed one and it will be long, if the time ever comes, when it will be otherwise, but whether sooner or later, it is of great importance for farmers to investigate and ascertain, the relative adaptation of stock and arable husbandry to the circumstances and surroundings amid which they are placed, so that they may bestow their labor where it will yield the best returns and at the same time increase the fertility of the soil.

My own conviction is, that the hopes of Maine in an agricultural point of view, centre in her meadows and pastures. When she becomes a great producing state, it will be chiefly for meat, wool and dairy products. For the production of these she is eminently fitted by nature, and by a judicious pursuit of stock husbandry will her arable culture be best promoted.

Assuming that the views here presented, and which also constitute a prominent part of the burden of previous reports, are admitted as correct, the inquiry next in order would seem to be, How may the greatest amount and value of *forage* be produced at least cost? and next to this, What animals or what breeds will give the most valuable returns in proportion to the food consumed?

The importance of cultivating roots, both as an ameliorating crop and as furnishing a large amount of cattle food, has been urged in former reports; but when all the attention is paid to these which they deserve, (and it is believed that as many acres might be profitably cultivated as there are now square rods grown,) still the chief reliance for forage is, and always must be, upon grass and hay; and in response to a desire, strongly, although informally, expressed by many members of the Board of Agriculture, during the past year, I will attempt, not an elaborate treatise on the grasses of Maine, but, to submit a few observations on the hay crop and some facts regarding the grasses known to possess agricultural value; their qualities, habits, relative value, adaptation to different soils, methods of culture and of harvesting, which it is hoped may be of use in directing a larger share of attention to, as it appears to my mind, this vital element in our agricultural progress.

The grasses are a vast order of plants comprising several hundred genera and probably not less than three thousand species. It strikes one at the outset, as a somewhat remarkable fact, that of this vast number only three or four, perhaps half a dozen at the most, are under general cultivation in New England. A large proportion of these thousands are undoubtedly of little economical value, and some no better than weeds upon the farm; yet it is highly probable that there are some, perhaps many, not yet introduced to, or improved by cultivation, which are naturally, or by cultivation may be made to surpass our herdsgrass, redtop and clover. "It is not at all certain that we have the best kinds, nor that those we have are

brought to the greatest degree of perfection. Doubtless grasses might be improved by a proper course of culture as well as fruits and blooded stock. New and peculiar varieties might be produced, suited to different purposes, combining the excellencies of two or more species, and thus adding largely to the value of our pastures and meadows. This improvement would also extend to the stock fed upon the improved grasses, yielding us a better article of beef, butter, &c. Loudon, in his Encyclopedia of Agriculture, relates that the introduction into the island of Jamaica of a grass from Guinea, (Panicum polygonatum,) as food for birds, has been the cause of the increase of horned cattle in that island, until it has a better supply, both for the butcher and planter, than almost any other country. Few markets in Europe furnish beef of better quality and at a cheaper rate than is now done by the people of Jamaica." *

A very promising field of discovery is here open to the diligent, patient and interested observer, whose labors may be rewarded by acquisitions of inestimable value to the agricultural interests of the country.

Before commencing my remarks on the grasses, viewed simply as forage plants yielding a crop of hay, it has seemed to me, that as this report is intended for general circulation among farmers and farmers' sons, there may be many, especially among the latter, who would be glad to learn something of their natural history, their structure, and of the means of distinguishing them accurately one from another, who yet have no ready means of access to works on botany for this purpose; and that for such persons, a few pages devoted to this object might be highly useful in assisting them to observe, and in exciting a desire for minute and extensive knowledge which would lead to study and to the procuring of such assistance as would be required; and for this reason are the subjoined remarks added.

The first division in the vegetable kingdom, made by botanists, is into Flowering plants, called PHÆNOGAMIA, (a term derived from two Greek words significant of the fact,) which produce flowers, and also seeds which contain in embryo new plants of the same species; and

* Lapham on the grasses of Wisconsin.

next, Flowerless plants, called CRYPTOGAMIA, which have neither flowers nor seeds, but are propagated by means of little bodies of homogeneous structure, and not containing any embryo. Among these are the mosses, lichens, ferns, (commonly called brakes,) mushrooms, &c., &c. Phænogamia or flowering plants, are next divided into two classes, based on the fact that in one the plants grow by accretions to the outside, and in the other they grow from the inside, crowding outwards. The first of these is called EXOGENOUS, signifying *outside growers.* Cut off smoothly a twig from a rose bush or a limb from an apple tree, and you find it made up of bark, wood and pith, and that the limb has increased by additions to the outside. Plants of this class have seeds made up of two flat or rounded pieces fitting closely to each other, called seed leaves, lobes, or cotyledons, and are therefore called *di-cotyledonous.* They may also be recognized by examining the leaves, which have *netted* veins. Nearly all trees in cold and temperate latitudes belong to this class. The second class is called ENDOGENOUS, signifying *inside growers.* If we cut a corn stalk or a stem of asparagus or a palm tree, if we were where the palm grows, we find an entirely different structure from what prevails in the outside growers. The inside is not divided into bark, wood and pith, but is all alike, and does its growing from the inside, crowding outwards the expanding covering of the stalk. The seeds of this class have but one lobe or cotyledon, as we see in a grain of wheat or kernel of corn, and are therefore called *mono-cotyledonous.* Plants of this class have leaves with *parallel* veins. It includes all the grasses, properly so called. Clover, which is spoken of in common language as a grass, is not one in a botanical sense, as it belongs to the class exogens, having a seed with two lobes and netted veins.

These two *classes* are next separated into a few SUB-CLASSES, and these into many ORDERS; the orders into GENERA, of which each genus may be composed of one or of many SPECIES, and each species into more or less VARIETIES, which is the lowest grade of subdivision, unless it be into individuals.

The Grasses (Gramineæ) are an *order;* the Phleum, Agrostis, Poa, &c., are each a *genus.* Phleum pratense, (Herdsgrass,) Agrostis vulgaris, (Redtop,) Poa pratensis, (June grass,) are each *a species* of their several genera, the Phleum, Agrostis and Poa.

Plants (and animals too) will perpetuate their own *species*, but not always their own *variety;* and especially when under cultivation, which has a tendency to effect changes. The very term variety, carries the idea of variation, as that of species does the idea of specific or essential identity. Thus the seed of an apple will always produce an apple—never a pear or plum—but the seed of a Baldwin apple *will not* always produce a Baldwin apple, it being a particular form or variety produced by cultivation in a species peculiarly prone to variation. Any particular variety of fruit can be continued only by extension of the original individual, (by means of buds, scions or cuttings.) So in animals; the sheep, the horse, the ass, are each distinct *species*, and perpetuate their own species, although their progeny may vary in form, size, &c. If, as in the case of the two last named, propagation sometimes takes place between allied species, it ends with the individual produced; the mule or hybrid being incapable of propagation. So in plants, impregnation sometimes takes place between allied species, and hybrids or mules are the result, and these are usually sterile; but when different *varieties* (of the same species,) are crossed, we have what are termed *cross breds*, and these not only propagate by seed but are often of great value.

It is by no means improbable that culture and crossing are yet to give us forage plants superior to any now known; for it should be recollected that the *cultivation* of grasses is but in its infancy as yet. It may be worthy of mention in this connection, that the plants known as artificial grasses (clover, &c.) were cultivated in Europe at an earlier date than natural or proper grasses. It is stated on good authority, that Red clover was first sown in England about the year 1645—little more than two centuries ago—white and yellow clover soon after. Rye grass appears to have been first cultivated there in 1677, but none of the other natural grasses for nearly a century, or about 1750, when it was the practice of some innovating practitioners or progressive farmers to sow along with their clovers, seeds shaken out of the best natural meadow (upland) hay.* In New England the case is different. The necessities of the colonists led them to sow natural grasses before it was practiced in England,

* Morton's Cyclopedia of Agriculture.

probably two hundred years ago, and many years before clover was introduced.

In what follows on this branch of our subject, I have borrowed freely from the treatise of Prof. Buckman on the Natural History of British Grasses, his observations being remarkably accurate and comprehensive.

"Grasses, as they appear over the surface of the earth, naturally divide into two sections—cereal or cultivated corn grasses, and natural or wild grasses. Now the first of these do not appear to grow anywhere as wild plants, but may in all cases be deemed as derivatives obtained from wild examples by cultivation through a long series of years, and hence the varieties—not species—which will be found to abound in all of them. These variations maintain a great permanency of form, if the circumstances of cultivation be strictly maintained; but left to themselves they would either die out altogether, or revert again to some original wild type.

The natural grasses may conveniently be divided into the following groups:

1. *Jungle* or Bush Grasses.
2. *Aquatic* or Water Grasses.
3. *Marine* or Seaside Grasses.
4. *Meadow* or Pasture Grasses.
5. *Agrarian* or Fallow Grasses.

Jungle grasses are those which for the most part have a tendency to grow in a distinct and separate manner, assuming in some tropical examples where they reach their maximum, the height of 50 or 60 feet, presenting more the aspect of trees than the lowly herbs of our northern species.

In our own country, though we fall far short in size, yet many of our species have the same disposition of growing in distinct bunches, having no inclination to form a matted turf, but mix with shrubs or grow as separate plants beneath tall trees, or maintain a distinctive form even in meadows. Of these the following may be named as examples:

Aira cæspitosa—Turfy Hair Grass;

Avena pratensis—Meadow Oat Grass, (narrow leaved;)

Festuca elatior—Tall Fescue Grass.

There are others, which if cultivated by themselves, assume the same distinctive and even cushion form of growth, as

Festuca ovina—Sheep's Fescue;

Dactylis glomerata—Orchard Grass.

These grow in tufts when sown thin, if the land be poor; but it can be prevented by close pasturing, fine harrowing and rolling, which take away all mosses and decaying grasses prejudicial to the formation of a good turf. Rolling presses the whole together and makes the soil firmer, a matter of much consequence in maintaining a fine, close sward.

Aquatic or *Water Grasses* are those which grow by the margin of rivers, in brooks and ditches or around the edges of ponds. These are not generally of any agricultural value, yet as sometimes seen in open meadows they give indication of a wet or swampy soil, and that draining is needful. Among the more common of these water grasses are,

Arundo phragmites—Common Reed Grass;

Phalaris arundinacea—Reed Canary Grass;

Poa fluitans—Floating Meadow Grass;

Alopecurus geniculatus—Floating Foxtail Grass;

Zizania aquatica—Wild Rice.

Of these, the wild rice is sometimes cultivated at the South, and the floating foxtail in Europe.

Marine Grasses. Under this head come the grasses which inhabit our salt marshes, the contiguity of salt water or marine mud being requisite for their growth. Of these, the following will serve as examples:

Ammophila arundinacea—Beech Grass or mat weed;

Spartina stricta—Salt Marsh Grass;

Poa maritima—Goose Grass;

Juncus bulbosus—Black Grass.

Meadow Grasses. By far the greater number of valuable grasses may be arranged under this head. They are those which supply us chiefly with hay, as also pasturage for cattle. Occurring as these do, over the country, under widely differing circumstances of climate, elevation, soil and modes of farming, an attentive study of them should enable us, upon examination of any district, to arrive at facts regarding the nature and value of any tract of ground with almost as much certainty as though we had long resided upon the soil, and had drawn our conclusions from what is called "practical experience;" and yet, though one may be termed "scientific," and the

other "practical," they are equally the results of observation, and both constitute knowledge of a practical kind. Of these, some of the more common are,

Phleum pratense—Herdsgrass or Timothy;

Agrostis vulgaris—Redtop;

Poa pratensis—June Grass or common Spear Grass;

Dactylis glomerata—Orchard Grass or Cocksfoot;

Alopecurus pratensis—Meadow Foxtail;

Festuca pratensis—Meadow Fescue Grass.

Agrarian or *Fallow Grasses* are those which occur in land under tillage. They are all weeds and some of them great pests. Among these are,

Agrostis stolonifera—Creeping Bent Grass;

Bromus secalinus—Chess, Cheat, Rye brome grass, Willard's Bromus;

Bromus mollis—Soft Brome Grass;

Poa trivialis—Rough Meadow Grass;

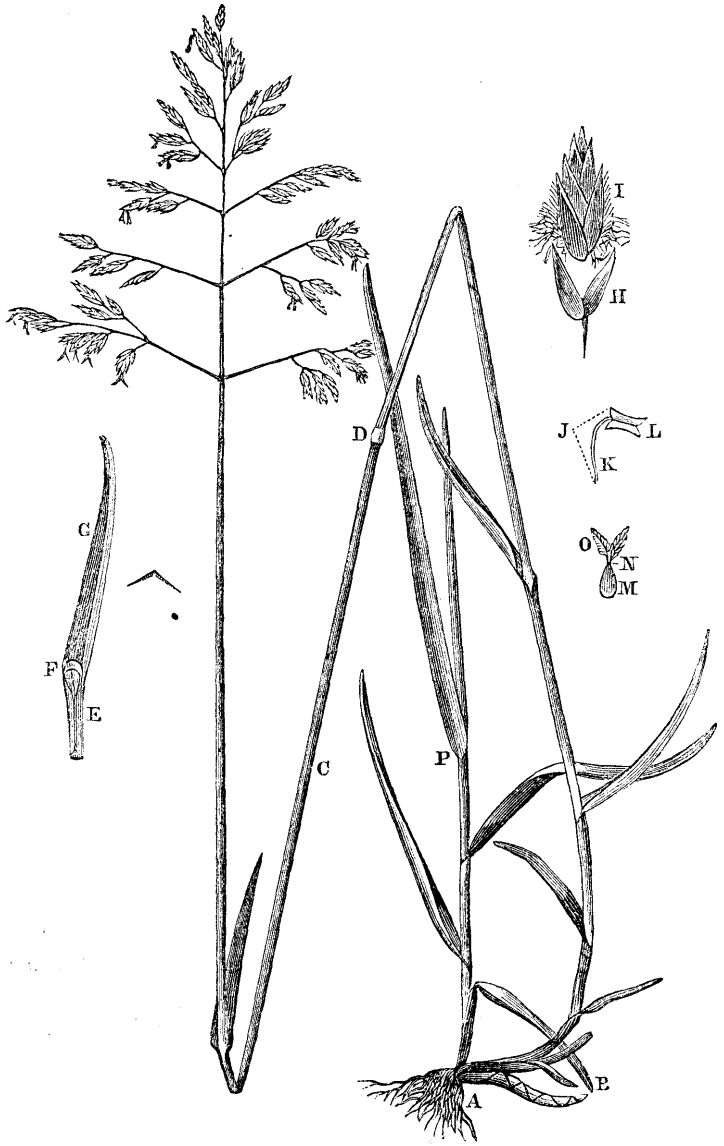
Poa annua—Annual or Spear Meadow Grass;

Triticum repens—Couch or Twitch Grass.

The latter three are sometimes sown, but appearing often where not wanted, they are very troublesome and difficult to eradicate. The last named is the most so.

In treating of the structure and anatomy of the grasses, it is well to remark at the outset, that they form an exceedingly natural group, and although they have such differences that species can be recognized by careful analysis, they yet have such agreement in common that the most casual observation is usually sufficient to determine one of the family to be a "grass," or to enable us to refer it to the *Gramineæ* as the natural order of plants to which it belongs.

There being then such similarity of parts in species of grasses, and these parts often minute, it follows that in order to understand descriptions so as to enable us to distinguish one species from another, or to *analyze* them, we must first understand the minute distinctive characters which such parts present. This done, the student may soon know them tolerably well; but otherwise, although he may learn *names*, it will be only in a traditionary manner and with constant liability to error, according as his informer may be well or ill acquainted with the subject.



Poa Pratensis.

A. Fibres; B. Rhizome; C. Culm; D. Node; E. Sheath; F. Ligule; G. Blade; H. Glumes; I. Glumels—Paleæ; J. Pollen; K. Filament; L. Anther; M. Seeds; N. Style; O. Stigma; P. Barren Shoot.

In grasses we meet with the following parts, all of which though tolerably constant in form in individuals of each species, yet in their variations *in different species* make up the sum of those distinctive characters which enable the botanist to separate one species from another. Such are

The Root, or descending axis, consisting of root fibres and rhizome;

Culm, or ascending axis, consisting of stem with its nodes and joints;

Leaves, the appendages of the axis, consisting of sheath, ligule and lamina;

Flowers, or *reproductive organs*, consisting of floral envelopes, stamens and pistils;

Seeds, or *fruit*, consisting of grains of various forms and sizes.

The roots of grasses usually consist of small fibres, which in starting from the seed, burst through the radicle or seed-root like the inner valve of a telescope from the outer; this, which is called by the botanists, endorhizal, from two Greek words signifying, *within a sheath*, may well be observed in the germination of such large grasses as are presented in the cereals, as corn, wheat, barley, &c. Roots are sometimes hard and wiry, especially in such species as grow in damp and boggy places; whilst in others they are exceedingly flexile, the main roots often creeping great distances in search of food, and then branching off into innumerable fibrils or rootlets, the ends of which, consisting of the newest cells or growth, form the spongioles or suckers by which nutriment is taken from the soil into the plant-system. It is hence necessary in the cultivation of grasses that the soil for the reception of the seed should be of good *tilth*, and especially that its mechanical consistency should be such that it will not greatly expand in moisture and so push the roots out of place, or crack in drought, in which case the rootlets or active parts in life and increase are broken away just at the period when they are most required. Roots are without buds, from which it will be seen that all the parts of a grass which grow beneath the surface are not always true roots, such for instance as the runners in the common couch or witch grass, (*Triticum repens.*) These receive the name of *Rhizomes*, or underground stems, and it is by means of these that the couch tribe of grasses so quickly spread from a com-

mon and small centre into large patches; as though they creep for a considerable distance, yet their points ultimately rise to the surface and then expand into new leaves, and in fact form distinct and perfect individuals, which if separated from the parent, all the more rapidly give rise to independent colonies, and indeed these scions do as their parents did before them. Several species of grasses have this tendency, and consequently when it occurs it forms a good distinctive character. Hence, though the *Triticum repens* has a rhizome, the *T. caninum* is furnished only with a fibrous root. Some of the *Poas*, as *Poa pratensis* and *P. compressa*, have rhizomes, while *Poa annua* and *P. trivialis* are without any. Several species of grass become useful from this very structure, in keeping together banks of sea coast, canals and the like.

Culm—stem. The stems of grasses are usually hollow and rounded, (except in Poa compresa, in which the name has been given from its oval form as though it had been subjected to pressure.)

The stem is separated into long or short lengths called *joints*, by the intervention of *nodes* (knots) which are solid, and tend much to strengthen the structure of the plant, to which end they will be found to be closer at the base where the strain would be greatest on account of these light plants swaying forward and backward in the wind, and more remote upwards in the culm, from which are suspended the newer and more active leaves. Stems vary in being smooth, ribbed, armed with hairs which may be long or short, bristly or downy. The nodes again, may be of a different color from the culm, or like it may be smooth or armed in a similar manner.

The leaves consist of the following parts:

The sheath—*petiole* or leaf stalk of other plants;

The ligule or tongue;

The lamina—blade or flat part of the leaf.

The sheath is the footstalk of the leaf. This takes its rise from the nodes, one from each, arranged on alternate sides of the culm. The whole length of the sheath, which is variable, is folded around the culm, from which it can be loosened by unwinding, without fracture, a circumstance which serves to distinguish the grasses from the sedges, (*Carex*,) as the sheath of the latter is a continuous tube in which the solid and often triangular culm is *inserted*, not folded. This is a distinctive character of great importance to observe, inas-

much as sedges and grasses are outwardly much alike—indeed some species of the latter are called *Carnation grass*—but greatly different in quality; grasses being for the most part nutritious plants, whilst sedges are not only usually innutritious, but from the harshness of their herbage, are often a source of injury and annoyance to the creatures that from starvation are sometimes doomed to eat of them.

The blade—lamina, is the expanded part of the leaf. It is sometimes large and drooping, as in the larger or flag-like grasses, but occasionally it is very minute, especially when compared with the sheath, as in the *Avena pubescens*, (Soft Oat Grass.) In some species the blade is long and the sheath short. The blade is traversed by longitudinal parallel lines which are called the *leaf veins* or *nervures;* these may be *broad*, *narrow*, *rigid*, *soft*, *armed with rough hairs*, and so on, all of which are not only points of distinction in species, but aid in making up the sum of those differences which will ever be found in good and bad pasture grasses: as for instance, grasses in which the herbage is covered with long downy hairs, are mostly poor and innutritious in quality; on the other hand, those of a harsh and rigid structure, with serrated leaves, whose edges act as a saw, and whose flat blades perform the office of a file, even if nutritious, would nevertheless be refused by cattle on account of their mechanical inconvenience.

The ligule, from the Latin *ligula*—spoon, scoop or strap. At the point where the sheath ends and the blade begins, occurs a thin and usually white semi-transparent membrane, termed the ligule or tongue. This, as it varies so much in size and form, will be frequently referred to in examining species, by some such terms as the following:

Short, in *Poa pratensis*—Smooth-stalked Meadow Grass;

Pointed, in *Poa trivialis*—Rough-stalked Meadow Grass;

Notched, in *Bromus mollis*—Soft Brome Grass;

In pairs, in *Ammophila arundinacea*—Sea Sand Reed.

Its value as a distinctive character may be drawn from an examination of *Poa pratensis* and *P. trivialis*, as it assists at a glance, to distinguish two grasses much alike in appearance, though very distinct in habit and general properties. The use which this part of the leaf subserves would appear to be that of more securely fast-

ening the upper part of the sheath to the culm, as without it the wind would tear the leaves downwards, in which case their functions would become much disturbed and they would soon wither and die.

The flower in grasses consists of the elements of an entire plant, each bunch, spikelet or *locusta* of flowers being but a grass in miniature, consisting of a central axis or stem with its alternately arranged leaves, the stamens, pistils and seeds in the axils of which are but buds; this fact may at once be seen in *viviparous* specimens, such as are often found in the *Lolium perenne* (Perennial rye-grass) and *Cynosurus cristatus*, (Crested dog's-tail,) in which instead of flowers, we have complete buds, which have been detached and grown as distinct plants of their respective species.

In these examples the case is very different from that of germination in the ear which takes place in lodged and damp wheat, as in the latter the seeds have been perfected, and germination takes place from heat and moisture in the usual manner; but in *viviparous growth*, the envelopes and their organs, instead of growing seeds on the principle of arrested development, go on growing into branches, and no seed is consequently perfected.

Flowers consist of the following parts:

Glume, from the Latin *gluma*, husk or chaff, outer chaff scales,
Glumel, or (*palea*, a Latin word of nearly similar signification with gluma), inner chaff scales, } Floral envelopes.

Stamens, Pistils, } Fertilizing organs.

Seeds—grain—reproductive organs.

Floral envelopes, upon the theory here adopted, consist of metamorphosed leaves; they are arranged in pairs, and each scale starts from an opposite side of the central axis, but not from the same point. The outer pair subserves the same use as the *Calyx* in other plants, and receives the name of *calyx glume;* the inner pair or pairs—for sometimes several occur in a single glume—is termed *glumel* or *palea*, and the pieces of which either are formed, obtain the name of valves; the lower one being the outer, and the upper one the inner of each respectively.

The glumes differ in shape, and in the presence or absence of lon-

gitudinal lines or ribs; it may be large enough to *include* or *conceal* the *glumel*, or it may be considerably smaller than the latter.

The glumel or palea is often found to be armed by a projecting spine or beard; this is of greater or less length, and is termed the *awn*, and may be well observed in bearded wheat and in wild and cultivated barleys. This organ when long and stiff, and armed as it is sometimes with projecting *spicula*, renders grasses wherever they occur, exceedingly objectionable, especially for hay, though the grass may be good if kept from flowering by constant depasturing; such are the species of *Hordeum*, (wild barley.)

The fertilizing organs consist of the stamens, which possess the following parts:

The filament or thread which supports

The anther or case in which is secreted

The pollen or fecundating dust.

The filament, by reason of its length, may cause the anther to be *exserted* or standing out from the flower, or from shortness to be *inserted* or included in its valves.

The anther may be varied in its color as follows:

Colorless, as in *Poa annua* —Annual Meadow Grass;

Flesh color, in *Phleum pratense*—Timothy Grass;

Rose, in *Alopecurus pratensis*—Meadow Foxtail;

Purple, in *Aira cæspitosa*—Hassock Grass;

Yellow, in *Bromus mollis*—Soft Brome;

Orange, in *Bromus erectus*—Upright Brome.

The pollen is usually of a light straw color.

The *Pistil* consists of a style, which is in one, or as it were, split into two parts, each surmounted by a *stigma*, either pointed or feathery; they are mostly very pale in color, but occasionally highly tinted.

The grasses with but few exceptions, belong to the Linnean order *Digynia*, (having two stigmata,) and the L. class *Triandria*, (having three stamens.)

Seeds are sometimes loose in the chaff-scales, as in the wheat; in others the glumel is adherent, as in barley, a circumstance which may readily explain how readily wheat grain is shed when "dead ripe," as the attachment of the seeds to the chaff-scales is much less firm than that of the flower to the flower stalk.

We will again mention all these parts together and commend their study, with a grass in hand:

Root { Fibres—the true root fibres.
Rhizome—creeping underground stems.

Stem, { Culm—the whole above-ground stem.
Joint—a single length from node to node.
Node—the hard knot between the joints.

Leaf, { Sheath—the folding portion of a leaf.
Ligule—the tongue of the leaf.
Blade—the lamina or free part of the leaf.

Floral envelopes, { Glumes—the outer chaff-scales in pairs.
Glumels or paleæ—the inner chaff-scales in pairs.

Fertil'ng Organs, { Stamen, { Filament—the thread supporting the anther.
Anther—the pouch containing the pollen.
Pollen—the fertilizing dust.
Pistil, { Style—the support of the stigma.
Stigma—the receptable for the pollen.

Seeds—the reproductive organs.

A barren shoot—a flowerless branch.

Thus far we have described the separate parts of the structure of the grasses; we have now to point out the terms used to designate them when taken together, as follows:

Herbage, that is, the leaf portion, principally concerned in pasture.

Culm, or parts which grow upright and make up so much of the bulk and weight of hay.

Heads of flowers; the various forms which they assume.

The quality of grasses depends so much upon the quantity and physical character of the herbage that, for agricultural purposes, these should always be noted with great care; hence if for hay, both bulk and quality is much influenced by luxuriant leafage, a character in which grasses will be found to differ in a remarkable degree; if however, this be rough and unpalatable, no matter how great its quantity, such should be discouraged. Again, if for pasturing, it will be necessary to note such facts as *longevity*, and how the species succeeds in sending up herbage under continual mutilation by feeding off. Many grass fields are at first mown for hay, and afterwards pastured; so that it is well to encourage the growth of all such species as will be found adapted to our soil, and will yield us the best return in both hay and herbage. Connected with this, we must not omit *duration*; as for permanent pasture, *peren-*

nial grasses are absolutely necessary, annual species having nothing to recommend them.

The *Culms* of grasses, whether *hard* and *wiry* or soft and pliable, bitter or saccharine, scanty or abundant, should also receive attention; as hay both in quality and bulk, will much depend upon these circumstances.

Heads of flowers. These are aggregated from single *locusta*, spikelets, or smaller bunches or bundles of flowers, which may vary in the following manner:

a A single glumel to each pair of glume valves;

b Two glumels and sets of flowers to a pair of glumes;

c Three or more glumels to each pair of glume valves.

Each flower, or *locusta* of flowers as b and c would be termed, may be attached to the stem in various ways:

On short upright foot-stalks (pedicels) in which the flowers unite into a compact head or *spike*, as in the Foxtail grasses;

On longer upright foot-stalks (pedicels) forming an upright panicle as in soft Brome;

On long and flexile foot-stalks, (pedicels,) a drooping panicle, as rough-stalked Brome.

It is not proposed to give technical descriptions of all the grasses which may be mentioned, but a few are added for the purpose of drawing the attention of the young farmer, who may be so disposed, to their minute differences, and this with the hope that many will procure the necessary aids and prosecute their investigations with diligence and perseverance.

PHLEUM.—Stamens 3; styles 2; flowers spiked; spikelets single flowered; spike compact; glumes distinct; glumel of two equal awnless valves.

Phleum pratense—Timothy—Herds Grass of New England. Glumes equal, truncated, with long points; each valve having a row of stiff hairs on the back; leaves long, flat, rough, with long sheaths; perennial.

AGROSTIS.*—Stamens 3; styles 2; spikelets in an open panicle; single flowered; glumes of two unequal valves, often longer than the glumel, the inner valve of which is sometimes minute or wanting, the outer either awned or awnless.

* Name derived from the Greek *Agros*, a field.

Agrostis vulgaris—Red Top—Herds Grass of Pennsylvania. Heads or flowers spreading, exceedingly light and elegant, mostly purple; culms one to two feet high; slender leaves, three to six or eight inches long; stolons more or less creeping; whole plant smooth; perennial.

ALOPECURUS.*—Stamens 3; styles 2; glumes nearly equal, united at base, compressed, keeled, awnless; glumel of a single valve, awned from below; styles commonly united; stigmas long and plumose.

Alopecurus pratensis—Meadow Foxtail.—Spike cylindrical, dense, soft, blunt at the apex, about two inches in length; general appearance much like Timothy, except the spike is shorter and softer.

ANTHOXANTHUM.—Stamens 2; styles 2; panicle spicate; glumes thin, acute, keeled, of unequal length; glumel double, outer one with short awns.

Anthoxanthum Odoratum—Sweet-scented vernal Grass.—Panicle contracted into a loose oblong spike, one to three inches long; culm erect, twelve to eighteen inches high; leaves two to five inches long; sheath nerved; ligule elongated; perennial.

POA.†—Stamens 3; styles 2; panicle lax; locusta of from five to ten florets; glume of unequal valves; the inner glumel notched at the extremity.

Poa annua—Annual Spear Grass.—Locusta of about five florets, not webbed; annual.

Poa trivialis—Rough-stalked Meadow Grass.—Locusta of about three acute webbed florets; leaves with a rough sheath; ligule pointed; perennial.

POA PRATENSIS—June Grass—Spear Grass—Kentucky Blue Grass—Smooth-stalked Meadow Grass.—Locusta of about four acute flowers with a web culm and herbage smooth; ligule short and blunt; rhizome creeping; perennial.

Poa compressa—Blue Grass—Flat-stalked Meadow Grass.—Culms flat, oval on a transverse section; rhizome creeping; perennial.

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* Name from the Greek *Alopex*, a fox, and *oura*, a tail, alluding to the form of the spike.

† An ancient Greek name for herbage or pasture.

We come now to consider the agricultural character and value of some of the grasses as forage plants.

a Meadow Foxtail--(Alopecurus Pratensis.)

b A spikelet magnified.

c The floret, consisting of a single awned glumel (or palea) removed from the glumes.

Alopecurus pratensis—Meadow Foxtail.—This is called by some of our farmers, June grass, a name more properly applied to *Poa pratensis.* In its general appearance, it closely resembles Timothy or Herdsgrass, but the spike is soft while that of Timothy is rough, and it blooms earlier, besides which, it gives a luxuriant aftermath. It is a very valuable pasture grass, being of early and rapid growth, and well relished by cattle, particularly by horses and sheep, although in nutritive powers it is not equal to some others. As a hay grass it does not appear to be worth cultivating here, although it is esteemed as such in England. Dickson says, "Of all the English grasses, this appears to be the most adapted for cutting twice." Buckman says, "This is a common native grass, especially in moist meadows and rich pastures, for which situations it is admirably adapted, as it yields a large proportion of hay and a quick growth of aftermath; it should always form part of the grass of irrigated meadows, as it is very early and bears cropping well, sending up culms and a plentiful supply of herbage for the hay crop, after first depasturing by sheep. In laying down land for permanent pasture, it should always take a place with other grasses." Judge Buel says, "It does best in moist soils, whether of loams, clays, or reclaimed bogs." Mr. Flint says, "It thrives on all soils except the driest sands and gravels. * * We have many grasses superior to it for cultivation, but for permanent pasture, it is superior to Timothy, which is not a suitable pasture grass."

Phleum pratense—Timothy—Herds Grass of New England—Meadow Catstail of England.—This is a native of England, early introduced from thence by Timothy Hanson of Maryland, from whom it derived the name by which it is most extensively known. According to some, it was first discovered in a swamp, early in the last century, by one Mr. Hurd of Piscataqua, with whose name it thus became associated. It forms the greatest portion of what is commonly termed English hay, being the best known and most largely cultivated of all the grasses. Although of foreign origin, it is, in this country, held in far higher esteem and is cultivated to a much greater extent, proportionally to others, than where it is indigenous. Taking all its qualities into consideration, it is the most valuable of meadow grasses; for although it is deficient in aftermath and second to others as a pasture grass, yet being highly nutritious and pecul-

larly adapted to our climate and to the wants of every description of farm stock, it has no superior for hay. It is a grass of easy cultivation, and particularly well adapted for growth upon moist, peaty and loamy soils, upon which when in good condition, from three to four tons per acre are sometimes cut; upon lighter and drier soils, tolerable crops are obtained with care, but it is never so much at home upon them, or so profitable as upon those first named. It seeds freely and abundantly, as much as thirty bushels of seed, it is said, having sometimes been obtained from an acre.

It has been a general practice with farmers to sow this grass with clover; but in many sections, this mode is falling into disuse, owing to the different periods at which they are severally fit for the scythe. If both be grown together, the crop cannot be cut so as to secure the best properties of each. The discussions which have prevailed so widely with regard to the proper time to cut grass, as also those regarding the proper height at which to cut, have had reference, in a great measure, to this grass. If cut when coming into bloom, it doubtless makes more palatable hay, but gives less weight per acre, and increases the liability of the plant to be killed out by drouth, and of subsequent crops, when not so killed, being weakened, owing to the peculiar formation and requirements of the plant. It is a grass of peculiar structure, in that it has a bulb or tuber above the roots, in which seems to be centered much of the vitality of the plant, and which it is important should at all times be kept in healthy condition.

The following, from the pen of Prof. J. P. Kirtland of Ohio, is commended to the careful study of all who cultivate this grass. "The proper time for cutting Timothy meadows, (Herdsgrass of N. England,) with reference to securing the best quality of hay, has been a fruitful subject of observation and remark. Little or no attention has been paid to the influence of the time and manner of cutting, over the health, permanency and productiveness of such meadows. A vague idea prevails among farmers, that if the mowing be performed before the seed of this species of grass be ripe, it will run out, from a failure to re-seed the ground. Every observing farmer has noticed that in some instances, extensive tracts of Timothy sward have suddenly died soon after the removal of the crop of hay, while in others, the sward continued healthy, and for a

series of years, produced abundantly of this grass. The rationale of such opposite results under apparently similar circumstances, had never been explained, so far as my observation extends.

My neighbor, Richard McCrary, an intelligent and practical farmer, has recently presented me with the annexed propositions and conclusions, as the result of his experience on this subject. These he illustrated by specimens of the grass in every condition to which he alludes. It is hoped they will be thoroughly scanned by persons competent to test their accuracy.

If they bear this test, to Mr. McCrary the credit of the discovery of the facts solely belongs; and I have no doubt the community will consider him as having conferred an important benefit.

1. Timothy grass is a perennial plant, which renews itself by an annual formation of "bulbs," or, perhaps, more correctly speaking, tubers, in which all the vitality of the plant is concentrated during winter. These form, in whatever locality the plant is found, without reference to the dryness or moisture. From these proceed the stalks which support the leaves and the head, and from the same source spread out the numerous fibres forming the true roots.

To insure a perfect development of these tubers, a certain amount of nutrition must be assimilated in the leaves, and returning to the base of the plant through the stalk.

3. As soon as this process of nutrition is completed, it becomes manifest by the appearance of a state of desiccation, or dryness, always commencing above either the first or second joint of the stem, near the crown of the tuber. From this point, the desiccation gradually progresses upward, and the last portion of the stalk that yields up its freshness is that adjoining the head. Coincident with the beginning of this process, is the full development of the seed, and with its progress they mature. Its earliest appearance is evidence that both the tubers and seeds have received the requsite supplies of nutrition, and that neither the stalks nor the leaves are longer necessary to aid them in completing their maturity.

4. If the stalk be cut from the tuber before this evidence of maturity has appeared, the necessary supplies of nutrition will be arrested; their proper growth will cease, and an effort will be made to repair the injury, by sending out small lateral tubers, from which weak and unhealthy stalks will proceed, at the expense of the orig-

inal tubers. All will ultimately perish, either by the drouth of autumn, or the cold of winter.

5. The tubers, together with one or two of the lower joints of the stalk, remain fresh and green during the winter, if left to take their natural course, but, if by any means, this green portion be severed at any time of the year, the result will be the death of the plant.

From these five propositions, the following conclusions are drawn:

1. That Timothy grass cannot, under any circumstances, be adapted for pasture, as the close nipping of horses and sheep is fatal to the tubers, which are also extensively destroyed by swine.

2. That the proper period for mowing Timothy is at any time after the process of desiccation has commenced on the stalk, as noticed in proposition third. It is not very essential whether it is performed a week earlier or later, provided that evidence of maturity has become manifest.

3. All attempts at close shaving the sward should be avoided while using the scythe, and in guaging mowing machines, care should be taken to set them to run so high that they will not cut the Timothy below the second joint above the tuber.

Agrostis vulgaris—Redtop of New England—Herdsgrass of Pennsylvania and Southern States. This valuable grass, well known to our farmers, and more commonly cultivated than any other except Timothy, is of European origin, and was introduced at an early period in the settlement of New England. It succeeds best on rather moist soils and grows better than most grasses on wet and cold uplands, producing a goodly quantity of hay, rather light in proportion to its bulk, and of good quality, though not of the very best. Its chief excellence lies in the fact that it is well adapted to our climate, very permanent, equally good for meadows and pastures, and yields a fair crop, both as to quantity and quality. As a pasture grass, it is esteemed for yielding a good and regular growth throughout the season, which is readily eaten by horses and cattle, especially if fed close—if allowed to grow up to seed, it is less relished and often refused.

This grass varies somewhat in its botanical characters and very much in its size and general appearance, according to the soil and the culture it receives. As seen in poor dry pastures, it is often

not more than five or six inches in height, and commonly called fine top. In rich moist soils, it grows from one and a half to two and a half feet high, and has a deeper color. These variations have led to some confusion and the bestowal of different names upon the same species.

a—Orchard Grass, (Dactylis Glomerata.)
b—A spikelet magnified.

Dactylis glomerata—Orchard Grass, Cocksfoot. This is one of the most valuable pasture grasses, although as yet cultivated in this State to only a very limited extent. It was at one time extolled beyond its merits as a meadow grass, but when made into hay being

found light and weak compared with Timothy, and so failing to fulfil the undue expectations excited, it fell too far below a just estimate. Another objection to its use for hay, is its habit of growth, being a jungle grass, and when mixed with others, standing in tussocks above the general surface, and so renders the sward uneven and not easy for smooth mowing. For meadows, it is best by itself, and seed enough should be sown to have the plants cover the whole surface and make an even sward. Its cultivation, however, as a meadow grass, is still extensive in some of the middle states, where it is by many preferred to Timothy to mix with clover on account of its earlier ripening, being in the best stage for cutting at the same time as the clover. There seems to be little doubt that it might be more extensively introduced to advantage among us, especially as a useful auxiliary in grazing and soiling. It is an early grass, starting with the first warmth of spring and affording a good bite sooner than almost any other. It is of unusually rapid growth, no one exceeding it in the quickness and vigor with which it shoots forth after being cut or eaten off, and it continues to grow until the ground freezes. It affords a good supply of foliage, the leaves being numerous, and if allowed to grow, reaching a height of two feet or more, with comparatively few flowering stems or seed stalks. It bears drouth better than other grasses, remaining green and vigorous when many others are dried up, and its roots being near the surface it is refreshed and invigorated by showers which produce no effect on clover. It is also one of the most permanent of grasses, being very tenacious of life when once fairly established. Orchard grass is less exhausting than Timothy, will bear considerable shade, succeeds well on all tolerably dry, friable soils of medium quality, and is said to be particularly adapted to those of a slaty character.

Judge Buel says of it—"Orchard grass is one of the most abiding grasses we have. * * Its early and rapid growth and its resistance of drouth render it peculiarly adapted to pasture, but all agree that to obtain its greatest value it should be kept closely cropped. Sheep will pass over every other grass to feed upon it. * * In July, I made a movable calf-pen thirteen feet square, in which two calves ten and twelve weeks old were confined in a field of Orchard grass. The pen was removed twice a day on to fresh feed, and the grass uniformly fed close. The growth was so rapid that the feeding

might be repeated on a good bite every fifth day. * It is suited to all arable soils. The seed is easily gathered, but on account of its peculiar lightness (the bushel weighing but twelve to fourteen pounds) the seed should be spread on a floor and sprinkled with water a day or two before it is sown, that it may swell and more readily vegetate. Sow two bushels on an acre with barley or other spring grain." Some recommend as much as three bushels per acre.

Arthur Young, to whom belongs the credit of having drawn to the culture of grasses in England the attention they deserve, speaks in high commendation of this grass, and took great pains to induce farmers to adopt its cultivation, and particularly as a substitute for Rye grass with clover.

Col. Powell of Pennsylvania, a breeder of fine animals, and a gentleman of scientific attainments, travel and nice observation, says, "I have tried Orchard grass for ten years. It produces more pasturage than any artificial grass I have ever seen in America."

Poa annua—Annual Speargrass. Very common by roadsides and in pastures, especially in the moister pastures. The estimation in which it is held varies greatly both among scientific men and practical farmers.

Mr. Flint in his work on grasses, says—"This modest and beautiful grass flowers throughout the whole summer, and forms a very large part of the sward of New England pastures, producing an early and sweet feed, exceedingly relished by cattle."

Prof. Buckman says—"In an agricultural point of view, this grass may be considered as a weed, as it has scarcely any feeding properties; and though it sometimes presents an apparently green turf over alluvial flats, and anywhere with a muddy subsoil, such grass affords as the farmers say 'no heart' in it. On some land of Lord de Mauley's, celebrated for scouring cattle, this grass was a prevailing one."

Poa trivialis—Rough Stalked Meadow Grass. This is less common than the *Poa pratensis*, and may be distinguished from it by the sheaths being rough and the roots being fibrous. It is found only in soils which are quite moist. Sinclair, Parnell, and some other writers, speak very highly of the properties of this grass, but there is reason to believe that it has been overestimated. It is very

late in its growth, and furnishes a good bite of succulent feed at a time when few others do, which may account for the observed partiality of cattle for it at such times. In agricultural value it ranks higher than *Poa annua* and inferior to *Poa pratensis*.

Poa pratensis—June Grass—Smooth-stalked Meadow Grass—Spear Grass—Kentucky Blue Grass. (For a cut of this grass see page 72.)

This is one of the most common and widely diffused grasses, and varying much in size and appearance, according to soil and culture. It is an early and excellent pasture grass, and in good soils makes a fair quantity of very good hay. In Ohio and Kentucky, it is known as Blue grass and highly valued, forming the principal feed in the famous Blue grass pastures. It starts early and grows late in autumn, but suffers more than some other grasses from drouth. It is less injured by cold and other climatic changes than almost any other species, and where milder winters prevail, is chiefly depended on for winter pasturage; and where snows cover the ground in winter, the previous year's growth is sometimes eaten in spring, before starting into new growth. Dairy cows fed upon it, will, it is said, furnish butter of superior quality. It grows in nearly all soils, being largest in such as are rich and rather moist. It frequently comes in of itself; does not come to perfection as a pasture grass in less than three or four years, and so is unsuited to alternate husbandry. Its chief value is as a permanent pasture grass. Among English writers, Sinclair and Dixon both say it exhausts the soil more than other grasses; an opinion from which Buckman entirely dissents, saying it exhausts only by producing grass, and "all good grasses exhaust the soil, if taken off in the shape of hay, and this one especially, by reason of its good crops; but such should be invigorated by manuring and good cultivation, for which this species amply repays."

Poa serotina—Fowl Meadow, Swamp Wire Grass, False Red-top. The Fowl Meadow is one of the few valuable grasses indigenous to America, and its excellence has been long known.

Rev. Jared Elliot of Killingworth, Conn., in his Essays on Field Husbandry, published in 1747, says—"it is sometimes called Duck grass, and is supposed to have been brought into a poor piece of meadow in Dedham, Mass., by ducks and other wild water fowl,

and thence called by such an odd name. * * It grows tall and thick, makes a more soft and pliable hay than Herdsgrass, besides it is a good grass not in abundance inferior to English grasses. It yields a good burden, three loads to the acre. This grass has another good quality which renders it very valuable in a country where help is so much wanting; it will not spoil or suffer, although it stand beyond the common time for mowing. It may be cut any time from July to October. * * This I wondered at, but viewing it attentively, I think I have found the reason of it. When it is grown about three feet high, it falls down, but doth not rot like other grasses when lodged. In a little time after, at every joint it puts forth a new branch; now to maintain this young brood of suckers there must be a plentiful course of sap conveyed up through the main stem; by this means the grass is kept green and fit for mowing all this long period."

Fowl meadow is properly a swamp grass, as it will not succeed on land dry enough for grain; on the other hand it will not thrive in soils which have an excess of water. It is most at home in very moist localities, and those which are occasionally overflowed but not long covered with water. In such situations it is of great value, producing abundantly of excellent hay. It does not, as quoted above, become hard or strawey by long standing, but is always soft. The general opinion is, that it is best cut in August.

Mr. Howard says—"Its tenacity of life is not great. Farmers who desire to keep up its growth, say it should be allowed to shed seed occasionally, in order that new plants may be produced."

Hon. Fred. Holbrook says—"This grass grows in patches, here and there, in the intervale lands near my residence. It has come in of itself and held long possession in certain places, and grows very vigorously wherever it has foothold. It somewhat resembles Redtop in general shape and appearance of stalk head and seed, but the head is of a lighter and paler color and the stalk grows taller and quite slender and delicate, while the bottom or lower foliage is very abundant and fine. It undoubtedly excels Herdsgrass and Redtop for a large product and fine quality of hay. It turns out a full swath to the scythe, the hay is easily cured, remarkably soft, tender and succulent, excellent for milch cows, and particularly for working oxen, during their labors in the spring season. It is not

liable to injury from the flooding of the land by freshets. That is a great merit, for these lowest portions of our river lands are subject to overflows, and after a winter or spring freshet, the water not unfrequently remains on the land a week or fortnight at a time, and sometimes before one flood has entirely subsided, another succeeds, and keeps the land wet for three or four weeks. I infer that the flooding is an advantage rather than otherwise, from the fact that wherever this grass has come in of itself, it has invariably done so on those portions of the meadow which are overflowed. The Fowl meadow grass will last for an indefinite period. The self-seeded patches in our meadow have flourished there for a long time in spite of wind and tide, yielding as full and good crops now as at any former period."

Poa compressa—Wire Grass—Flat-stalked Meadow Grass—Blue Grass, (not the Blue Grass of Kentucky.) This is a very hardy species, growing even on the driest soils and upon rocks barely covered with earth. It is readily distinguished from *Poa pratensis* by its flattened stem and darker green color. Mr. Howard* says, "It is perhaps the most nutritive grass known. All grazing animals eat it with avidity, and sheep are known to fatten faster on it than on any other. It shrinks less in drying than any other species, and makes in proportion to its bulk the heaviest, and at the same time the best hay, though the yield per acre would not be large." Dr. Darlington says, "cows which feed on it yield the richest milk and finest butter." A serious objection to it for hay is its scanty production of herbage, besides which it is, in arable culture as really a pest as *Triticum repens*, Witch grass—its creeping roots retaining life with great tenacity, even under much exposure. For dry, ledgy pastures and rocky knolls never under the plow, it is a highly valuable grass.

Poa nemoralis—Wood Meadow Grass. This is not so often met with as the above named species, and has never been much cultivated. It is readily eaten by cattle, and would probably succeed in moist and shady places.

Several other species of Poa are sometimes met with, among which

* Prize Essay on Grasses.—New York Transactions, 1855.

are *Poa fluitans*, Floating Meadow grass, or Manna grass, *Poa aquatica*, &c.

Festuca pratensis—Meadow Fescue. This is the most common of the fescue family, and a valuable pasture grass, somewhat conspicuous by reason of its glossy green foliage. It ripens with the June grass, earlier than most others, and so readily propagates itself by self-sowing. It is recommended by English writers to be used in mixtures for seeding pastures, but is rarely if ever sown purposely in this country. Its long tender, succulent leaves are abundant and readily eaten by cattle. Its habit is somewhat of the jungle or tussock style, causing an uneven surface, and is oftenest found in moist pastures and rich grass fields. The *F. elatior*—Tall fescue, and the *F. loliacea*—Slender spiked fescue, often ranked as distinct species, are varieties of the same species, the apparent difference in which has been caused by cultivation. It is said to be identical with the Randall grass of Virginia.

Festuca ovina—Sheep's Fescue. This grows from eight to ten inches in hight in dense tufts. It receives its name from the eagerness with which it is eaten by sheep. *F. duriuscula*, Hard fescue, and *F. rubra*, Red fescue, are probably varieties of the same species.

Bromus secalinus—Chess, Cheat, Willard's Bromus. There are several species of Bromus, with regard to all of which the farmer's principal interest is to keep well rid of them. Notwithstanding the above named species has long been a well known pest in all wheat growing sections, it is only a few years since it was brought prominently into notice and extolled, as humbugs are wont to be, as a new and valuable grass, producing very abundantly of a quality superior to any other species, under the name of "Willard's Bromus." Four and five dollars per bushel were paid in many instances, besides giving a pledge that it should not be allowed to go to seed, (this in order to keep the *cheat* going or growing beyond the first season, as being an *annual* weed it would both show its true colors the first year and die if not cut early.) The cheat went so smoothly for a while, that in some instances prominent officers of Agricultural Societies in a neighboring State were induced to use their influence to extend its cultivation.

Triticum repens—Couch Grass—Witch Grass—Twitch Grass—

Quitch Grass, &c.—This is one of the most catholic of all grasses, in its tastes and habits, in so much that scarcely a garden or field, pasture or roadside can be found, be the soil what it may, which is not occupied by it to greater or less extent; and if permitted, its long creeping roots—or more properly, *rhizomes*, (underground stems,)—pushing in every direction, will soon have full possession, and monopolize all the plant food within its reach. It is commonly regarded as a troublesome pest, from the difficulty of eradicating it, and the injury it does by choking other plants. Cattle eat it readily enough, either as grass or hay, and on loose sands its roots are useful in binding the surface. Detested as it usually is, some farmers advocate its culture for hay. One told me not long since, that he would be glad to sow ten bushels of the seed on his farm. Another writes me: "Its value for dry forage, I consider equal to either Herdsgrass, Redtop or Clover. I do not sow the seed because it is unnecesary, my farm having been well stocked with it when I purchased; but had it not been so, I do not hesitate to declare, that with my present knowledge of its value, I should labor diligently to introduce it."

Viewed simply as a grass for hay, the principal objection to it is that it gives but a moderate crop at the best, standing very thin; and if the soil be rich, it lodges and turns yellow, before fully grown; besides, it rapidly exhausts the soil, and also checks the growth of better grasses, by what is called 'binding out.'

Phalaris arundinacea—Reed Canary Grass.—This fine looking, deep green grass, frequently arrests attention by its luxuriant growth and promising appearance, but is of little or no agricultural value, except as indicating by its presence, the need of draining; and where such land is properly drained, it dies out. The liability of this grass to become filled with ergot, if it stands beyond the time of flowering, is sufficient to condemn it, were its nutritive properties far greater than they are. A variety of this grass with white stripes in the leaves, known as Ribbon grass, is sometimes cultivated as an ornamental plant. This peculiarity it loses however upon being transferred to wet situations.

Ammophila arundinacea—Beach Grass—Mat Grass—Sea Sand Reed.—This is remarkable for its creeping root, or, more properly, rhizome, which is sometimes twenty to thirty feet in length. It is

a very common occupant of the sea-side in all countries, and although of no agricultural value, it has many times been cultivated, as from its peculiar growth, it operates very beneficially in tying up and keeping together the sands of the coast. In England it is preserved and carefully looked after, by act of Parliament, for this reason. Congress has expended at various times, upwards of thirty thousand dollars in its culture on Cape Cod, for the protection of Provincetown harbor from the blowing sands which were driven in by north winds, and which threatened its destruction. Its culture, where needful, is of the easiest and simplest character possible. It may be worth a trial on deep railroad cuttings, in sands liable to blow, or in sandy clays liable to slide from wet and frosts. Dr. Darlington, in his Agricultural Botany, ranks this grass as a species of *Calamagrostis.*

Anthoxanthum odoratum—Sweet-scented Vernal Grass—Vanilla Grass.—This is particularly noticable for its fragrance, which is said to be owing to the presence of benzoic acid. Its strong aromatic odor is perceptible, upon being bruised when green, and given off freely when drying, and is imparted to other grasses when cured with them. One author speaks very highly of it, and deems the peculiar flavor of the spring butter sold in Philadelphia, to be in consequence of its forming a considerable part of the feed in pastures in that vicinity. It is not generally believed to be either very rich in nutritive properties or particularly acceptable to cattle. It starts quite early in spring, and runs to seed sooner than almost any other. Mr. Flint, in his work on Grasses, says, that it is also one of the latest in autumn, and esteems it as a pasture grass when mixed largely with others. The seed was widely distributed from the Patent Office, a few years since. I should judge it to be indigenous to Maine, having seen it in many sections, on both dry and moist soils, growing most freely however, on the latter.

Panicum germanicum—German Millet, Hungarian Grass, Honeyblade, Golden Leaf, &c. Much has been said and written lately about Hungarian grass and Honeyblade as new and superior grasses destined to eclipse all others. Upon trial they prove very similar to, if not identical with, what has long been known as German or Hungarian Millet. Encomiums of the highest character as to its productiveness and value have come to us chiefly from the West,

Sweet Scented Vernal Grass, (Anthoxanthum Odoratum.)

and there is little doubt but that this grass is admirably adapted to their rich mellow soils, nor that upon such soils it is highly productive and of good quality, and a very desirable crop where it is as difficult to grow Timothy as it is upon the prairies.

In the Eastern and Middle States it was sufficiently proved years ago as an annual plant yielding a very tolerable substitute for other hay, but not better than is supplied by Indian corn, oats or barley when cut green. It requires a rich soil, and is deemed rather an exhausting crop. If cut for fodder, it should be before the seeds fill, as otherwise the stems are hard and stiff. The well known Barn

grass, *Panicum Crus-galli*, is a member of the same family, and has been occasionally tried for green fodder, and by some has been stated to be both nutritive and very acceptable to cattle.

Zea mays—Maize—Indian Corn. This is a proper grass in a botanical view, although like wheat, barley and oats, usually grown for its grain; yet as a fodder plant it is of exceeding value, and has come to be so appreciated by our farmers that many now grow it to greater or less extent, especially for feeding to milch cows during the summer drouth which occurs so often that it is always safe and wise to be prepared for it. As a resource in such case, it is the most valuable plant we possess, and deserves more extended culture. The only difficulty in the way of storing immense crops of dry fodder from Indian corn, is the extreme juiciness of the stalks and foliage. We yet need extensive and continued experiments to show the most feasible and economical method of curing it for winter use. Several methods have been suggested, and to a limited extent tried, but not sufficiently. One is to spread it upon racks in a building roofed over and open at the sides, and another by artificial heat in a manner analogous to kiln drying—both are said to have proved successful.

The amount which could be grown upon an acre is very large, greater than from any other plant, and when well cured it is exceedingly palatable and nutritious.

For this purpose it is deemed best to sow the Southern or Western dent corn in drills two and a half to three feet asunder, so as to allow the passage of the cultivator between the drills, and at the rate of three or four bushels per acre. When grown for winter use it should be sown quite thick and early, as thus it is more easily dried. If for soiling purposes, it should be sown at intervals of a week or ten days, beginning the latter part of May, and in all cases upon land in deep and fine tilth and well manured.

Sorghum ————————? Chinese Sugar Cane.—This plant was introduced a few years since, with high recommendations both for the production of syrup and sugar and as a forage plant. In its latter capacity, the most contradictory results have been observed; and as many still deem it valuable for late fodder, it may be well, by way of caution, here to quote the following, translated from an article by the Marquis de Vibrave, published in a recent No. of the "Journal D' Agriculture Pratique." "If the effects observed, not

only in my cultivation, but also in that of many of my neighbors, be frequently renewed, we must necessarily ascribe to this plant a deleterious influence. On a farm of mine, twenty five horned cattle have been fed exclusively on Sorgho during a month; and from the day on which it was introduced, the journal of the farm shows a diminution of one half of the profits of the dairy; and this decrease was observed every month of feeding with it. Besides this, my neighbors assert that the cows fed on it are sterile."

ARTIFICIAL GRASSES. Among the plants used for the production of hay, and which are not properly grasses, but in every day language are spoken of as such, the one in most general cultivation is *Trifolium pratense*—or Red Clover. Of this there are two pretty distinct varieties, the one commonly known as Northern and the other as Southern or Western Clover. The first attains a much greater hight, has coarser stems, and ripens considerably later than the last. The Southern or Western gives a better second crop, produces seed more freely, and by itself, makes a better quality of hay, on account of the fineness of the stems and greater abundance of the foliage and bloom. Each has its warm advocates for preference, and both being so well known to most farmers, either from experience or observation, or both, it is scarcely necessary to discuss their comparative merits farther.

There is also considerable diversity of opinion among farmers with regard to the value of clover hay, much of which has probably arisen from the treatment bestowed in curing. If cured in the ordinary manner in which other hay is treated, the stems become brittle and the leaves and flowers, the most valuable part, become browned, crisp, and many fall off, and are lost. In this case it is inferior to herdsgrass or to good upland meadow hay from mixed grasses, but when cut in season and cured so as to preserve all its natural qualities, it is not deemed inferior, and many think it better for milch cows and for young and growing stock, while for working cattle its value is fully three-quarters that of hay from mixed herdsgrass and red-top, and perhaps more. The preferable mode of curing is to cut after the dew is off, and when thoroughly wilted, fork it into small cocks where it remains with no farther disturbance, unless it be a lightening or turning of the cock with the fork, until fit for the barn, whither it may be carried with safety while yet damper to

the touch than ordinary hay—if the weather be fair and dry usually by the third or fourth day.

Trifolium repens—White Clover—Dutch Clover—Honeysuckle. This is a very hardy perennial species, everywhere common and in some years very abundant. It is a valuable plant in pastures, adding considerably both to the amount and quality of the herbage. It is not much cultivated for hay, but in many fields of tenacious and moist soil, it gives a thick bottom which materially increases the crop; most abundant in moist seasons, often appearing in a wet year where it had not been observed before. This plant richly deserves a far greater degree of attention from the farmers of Maine than it has yet received.

Trifolium hybridum—Hybrid, Alsike or Swedish Clover. Of this variety I cannot speak from personal knowledge, it having been brought to my notice, not long since, by the late Dr. Cuming, Vet. Surgeon, of St. John, and known to readers of previous Reports, as a valuable contributor, and whose acquaintance with scientific and practical agriculture was both extensive and intimate. He spoke of it as being of comparatively recent introduction into Scotland when he left; as rapidly coming into favor wherever tried, and that not unlikely it might prove a valuable acquisition in New England. It has long been cultivated in Sweden, and is strongly recommended by writers, for cold, moist and stiff soils. It resembles the common red clover in duration, hight and mode of growth. It has been said to last fifteen or twenty years, which is an error arising from the facility with which it sows itself when the flowers are left to mature. It is usually mown once for hay, and then left for pasturage. The stems are hollow, not creeping, but spreading unless sown close. It blooms profusely, the flowers resembling those of white clover, but larger and of a rose color mixed with white, and turning downwards, as they fade. They emit a sweet, agreeable odor, and afford an excellent forage for bees. The seed has been recently disseminated by the Patent Office, but what success has attended it, I do not learn.

In a publication issued by the Canadian Board of Agriculture, there is a communication from Mr. Patrick R. Wright of Coburg, under date of February, 1858, from which the following is taken:

"Having had enquiry made by several of my friends, who were

aware of my having cultivated the 'Alsike clover' for several years, and believing I am the only one who has done so in Canada, I wish to draw the attention of farmers to this new and admirable variety of the *Trifolium.*

"The Alsike clover is indigenous to Sweden, where it has been cultivated for the last century, and has in some cases been known to grow to the height of four feet; but in England, Scotland, and *in Canada*, about two and a half feet may be the average hight. The root is fibrous, and the heads globular. The plant bears a greater resemblance to the white than to the red clover, and although its stems are recumbent, they do not root into the ground like those of the white clover; in short it may be described as a 'giant' white clover with flesh colored leaves. It will yield in the old country, two mowings annually, but in Canada one mowing, with a heavy second crop for pasture will prove the most profitable course to follow.

"Linnæus observed the Alsike clover growing on poor, bare, obdurate clays in the Morea, where no other plants could be made to vegetate; and yet under such unfavorable circumstances, this clover flourished with an uncommon luxuriance, and yielded shoots as tender and succulent, though not so abundant, as if reared in the most richly manured fields.

"Sturm says, it is found in Holland, and that he has tried its cultivation, along with that of a great number of other clovers placed under the same circumstances, and the result convinced him that there is no other kind of clover equal to it for the purposes of cattle feeding. With these remarks I most cordially concur. Both sheep and cattle are so fond of it, that the common clover, or Timothy and clover mixed, are quite disregarded, if access could be forced to the Alsike, both as pasture and hay. The common red clover will last only two years in perfection, and often if the soil is cold and moist, nearly half the plants will rot, besides its liability to be thrown out or winter-killed, and in the second year bald patches will be found in every part of the field; besides that, in September and October, many crops left for seed, are lost in consequence of the heavy rains during that period, while the Alsike clover, on the contrary, ripening its seeds perfectly *the first crop*, and continuing its vigor much longer, much risk and expense are avoided, and a larger

profit accrues; and when this plant is once established, it will remain for many years in full vigor, and produce annually, a great quantity of herbage of excellent quality. Four years ago, I obtained from Messrs. Lawson of Edinburg, five pounds of seeds, which I sowed to one acre, and as I was cautious in my experiment, mixed it with about two or three pounds of Timothy. It stood the winter admirably, and I cut the following year, certainly *not less* than *three tons* of the finest clover hay I had ever seen. In the end of June, and before ripening its seeds, I expected to have the second crop run to seed, which it did not, but produced an unparalleled mass of feed, so close and even and about one foot in length, that I could have fancied it would bear one up to walk over it. The second year I had an equal quantity mixed with Timothy, and I found the clover, when the seeds ripened, to suit the time for cutting the Timothy exactly, without blackening and going to waste, as the common red does. I consider this as its *greatest* recommendation, for we all know well, that red clover and Timothy, the usual mixture sown, is on account of the inequality of ripening, but ill suited for producing an abundant crop of *first class hay*, as the one or the other must be partially sacrificed. The third cutting, last year, was heavier than either of the former, such as only a first rate machine could have given the *coup de grace* to. By shaking, I got as much seed as has covered four acres with as fine a plant, and as thick as can be expected, and I feel confident in taking twelve tons of hay from the piece this year."

In a later communication, of July 6, 1858, accompanying a sample of the clover sent to the Board for examination, he says, "Upon my four acres, three men have been mowing three and a half days. There will be about fifteen tons."

Among the foreign notices of this clover, I find a report of a trial in East Lothian, Scotland, on an extensive scale, (upwards of sixty acres.) After stating the details of culture and results, the writer adds: "I have, therefore, every reason to be satisfied with the experiments I have made with this species of clover, having found it to grow freely and thick, and to be the earliest and finest herbage for any description of stock, that requires early, fine clover, especially up to midsummer. It is an invaluable auxilliary to red clover, and quite capable of forming a substitute for it. It has the

disadvantage of not bearing a drought so well as the Red, owing, I presume, to the fact that the surfaces of its leaves being less, and thereby not extracting so much support and moisture from the atmosphere during nights and mornings, as the other. It has a much finer stalk and its roots are not so strong, nor do they strike so deep, which may be the reason of its not standing the drouth so well." He adds his belief, that it is quite as well adapted to light as to heavy soils. From what I have been able to learn of this variety, I deem it worthy of careful trial in Maine.

I have already remarked that clover is not properly *a grass*, as it belongs to an entirely different order, viz:—the *Leguminosæ*, and not to the *Gramineæ*—this, to be sure, does not concern the farmer who only desires a good crop of hay, but it is also true that the botanical distinction is not more marked than are their different requirements, for the proper grasses are greatly stimulated in growth by the salts of ammonia, which produce little effect upon clover. Clover, on the other hand, is greatly stimulated by the application of mineral manures, as gypsum, phosphate of lime, &c., which scarcely increase the growth of grasses at all.

This fact was very distinctly brought out in a series of carefully conducted experiments by Messrs. Lawes and Gilbert, reported in the last number of the Journal of the Royal Agricultural Society of England, and which were instituted to show the effects of different manures on permanent meadow land. These were quite too extended and elaborate to allow of even a brief abstract being given here, but I quote a single paragraph, which will suffice on this point:

"It will be shown in some detail in a subsequent section that the description of the increase differed extremely. In fact, where the ammoniacal salts were employed, the increase was exclusively due to the increased growth of *Graminaceous* plants—the so called *Natural Grasses*—there being scarcely a *Leguminous* plant to be found upon the plot. Where the purely mineral manures were used, on the other hand, the *grasses*, properly so called, were observed scarcely to have increased at all; whilst the whole plot was thickly covered with Perennial Red Clover, (*Trifolium pratense perenne,*) and some other Leguminous plants. Such a result is perfectly consistent with what has been before established regarding the (so to speak) characteristic adaptation of mineral and nitro-

genous manures respectively to those crops of the respective families which are grown in our rotations." Farm yard manure, which contains both ammoniacal salts and mineral matters, was found to be of great benefit to both.

The hay crop of Maine is estimated at not far from one million of tons, and its value at ten millions of dollars annually*—quite as much, if not more than the value of all the other cultivated crops of the State taken together; and the most important interest in the State. If to this we add pasturage, the amount is materially increased—perhaps doubled.

The importance of this crop appears not only from its actual and comparative value as expressed by dollars, but from other considerations. In this climate we are compelled to feed stock for half the year from winter stores, and for these we must depend chiefly upon hay. Upon this then depend largely our flocks and herds, and upon these, our ability to enrich the soil so as to insure a yield not of the products of a stock husbandry merely, but bread for ourselves. Never was a truer saying, and seldom one of broader and deeper import, than the utterance of the Voice, "all flesh is grass."

From the nature of our surroundings, grass is and always must be the staple crop of Maine. The climate, it is true, if no other crops were to be grown, might be found better adapted to it if more equably moist and mild in spring; but look this vast country over, to Florida at the south, to California at the west, and see if, on the whole, any other State whatever has greater facilities in this regard than we?—the long winters even which we are so apt to deem a serious drawback, afford a protection to the tender herb in the warm blanket of snow which is not to be lightly esteemed, and which many others are deprived of.

Much of our soil is so "natural to grass," that when in condition to yield good crops of other products, we have to be active and vigilant to keep it out when this is desirable.

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* This may be deemed by some too large an estimate for the past few years, in some of which the hay crop has not been very large, but when we note the fact, that in 1850 the census returns show a crop of 755,889 tons, and recollect too the proneness which always exists to *understate* in response to questions which may be supposed even to squint towards taxation, and also the large increase within ten years past, I think the reader will agree with me that it is a moderate one.

Such indications would naturally lead a stranger to the conclusion that grass is largely grown in Maine, and an examination will show that notwithstanding the present barren condition of so many fields, we still cut, in proportion to our population, about twice as much hay as the average of the States of the Union.

Such being the magnitude of this interest, it is patent that nothing else upon the farm better deserves earnest and thoughtful attention. If improvement can be effected by which the crop can be increased only a hundredth part, this will secure a gain to the farmers' pocket of one hundred thousand dollars—if increased one-tenth, it will amount to one million of dollars—if one half, the gain will be five millions, and if doubled, no less than ten millions of dollars; and if pasturage be included, as much as ten millions more.

I know of no reason why such an increase, or even a much greater one, in amount and value, may not be effected.

When we look at the thousands of wet meadows and unreclaimed swamps, many of them of considerable extent, containing untold quantities of vegetable food, and into which the mineral riches of hill and upland adjoining has been gathering for ages past, and which need but to be relieved of injurious water and supplied with air in its place, to equal in fertility for grass the best intervals by our rivers' side—when we look at the loss and waste of manure which prevails upon the great majority of farms in the State—when we look at the unclaimed fertilizers of the ocean—seaweed, muscle bed, fish refuse, etc., which are easily available along a sea-coast more extensive and more indented than that of any other State in the Union—when we look at the great diversity of methods employed in the preparation of the soil—in seeding down—in the treatment after seeding, in the time of cutting and the style of harvesting, all of which certainly cannot be the best, we cannot fail to see ample means of securing a vast, perhaps indefinite, increase, and of corresponding prosperity.

Suppose we look for a moment, more critically to the result of improvement upon a single point.

The hay crop of Maine is now harvested from more than a million of acres, perhaps a million and a quarter, or a million and a half. Suppose the same amount cut from half the surface, would there be any gain, and if so, how much? The cost of cutting, curing and

storing a ton of hay grown on an acre and a quarter, in average seasons, cannot be reckoned less than $2.50, (many farmers put it at $3 or upwards,) at present prices of labor.*

Two tons upon the same area can be cut, cured and stored, in circumstances otherwise similar for $3.50 or an additional dollar per acre, and probably for less—a saving of 75 cents per ton, which upon the crop of the State, would amount to $750,000. It might be said, and with truth, that the quality of hay grown at the rate of a ton and a half or upwards, per acre, is not fully so good as that grown at the rate of only a ton per acre; but when we recollect that by the supposed change, one-half the land now occupied as meadow would be left for pasturage, we find here a gain far out-

* I have found considerable difficulty in ascertaining with anything approaching exactness, the usual cost of haying in the State at large.

The following, from S. F. Perley, Esq., late President of the State Agricultural Society, is much the most precise and definite reply I have received.

"In answer to your question as to the cost of harvesting hay, I offer, in tabular form figures, which I extract from my farm journal. It is proper to remark that the season has been extraordinarily favorable for the hay harvest. No time has been lost, and no work twice done; hay once spread was sure to be fit for the barn.

Number of Field.	No. Acres.	Dist. fm barn to center of field, in rods.	Yield per acre. lbs.	Cost of harvesting, per ton.	Cost of harvesting, per acre.
4	5	100	800	$3 54	$1 42
6	5	90	800	3 51	1 41
5	5	150	1,600	2 81	2 53
11	7½	50	1,600	2 78	1 84
10	5	50	2,400	2 32	2 78
1	3	40	2,600	2 32	3 10
8	12	30	3,000	1 77	2 52

You will perceive that my fields yield from 800 pounds to 3,000 pounds, per acre. The cost of harvesting being varied by the distance from the buildings, I have given a column of distances. The labor employed was equal to

Able bodied men's labor,	50 days,	$1.50	per day,	$75 00
Machine labor,	3½ "	5.00	"	17 50
Horses "	11 "	75	"	8 25
Ox "	4½ "	1.00	"	4 50
		42 tons,		$105 25—$2 51 average.

The actual cost was somewhat below the above average, as part of my labor was hired by the month, which comes lower than day labor. The per diem can be changed to suit the locality.

I cannot give the cost of harvesting an acre, bearing two tons, from actual trial, as no one of my fields averaged that amount. But you will see that the *greater* the yield the *less per ton*, and the *more per acre*, the cost, and vice versa."

weighing the trifling inferiority in quality, and which should, in fact increase, rather than lessen, the estimated saving by a better husbandry. That such a gain is practicable, has been proved again and again. Repeatedly have farmers told me—"I now cut over but about half as much land as formerly, but I get fully as much hay, and get it easier." This is one, and only one, of the many ways in which saving or profit can be effected; and similar calculations on other points in hay culture, would show that immense gain to the agricultural interests of the State would result from the adoption of possible improvements in its culture and harvesting.

The value of hay as food for animals depends in large measure upon the time when it is cut and the method in which it is cured, yet notwithstanding the acknowledged importance of these points and the length of time during which the attention of thousands of interested observers has been directed to them, no conclusions have been arrived at which command universal concurrence. Consequently, practice varies according to the views held. Some cut as soon as the bloom appears, or even earlier, and others at all subsequent stages until the seeds fall, and the plants are so dry that the product may be stored almost as soon as cut. Such differences of practice must necessarily be followed by a wide variation in its value. That such variation actually exists, is evidenced by the fact, that upon the same quantity of hay, and this made from the same grasses, the stock of one farmer will thrive and that of another will dwindle. If hay was directly consumed by men and women, instead of being, as it is, an indirect means of their sustenance, it seems altogether likely that there would be, ere this, more general acquiescence on both the above points, and that the variation which might still prevail could be accounted for on the ground of differing tastes, as some would prefer more salt in their butter than others.

Upon the *value of grass* there is far less difference of opinion. Few will hesitate to admit that animals upon good pasturage, supposing them to come out in spring in a condition which enables them to progress at once and without waiting to repair the wastes of winter, will thrive more rapidly, on grass only, than upon any other food.

The principal point to be inquired into in order to decide the best period for cutting, is, when does grass contain the most nutriment?

And to this, no definite and precise answer can be given, which will be alike correct in all cases, for the reason that in different grasses, this stage is not the same, being earlier in some than in others; but for a general answer, both theory and the opinions derived from the experience of the great majority of intelligent and observing farmers, concur in the reply—When in full blossom, or while the bloom is falling. At this period, most grasses have, so far as can be judged, obtained from the soil and from the atmosphere, the greatest amount which they will have at any stage of growth, which is of value as food for animals, and these exist at this period in the most valuable form. The changes which take place subsequently, are chiefly within the plant; a part of the starch, sugar, gum, albumen, &c., soon go to assist in the formation of seed, and a part to constitute woody fibre, which is indigestible and worthless; and so much as is thus converted, is actual loss. Of hay cut at a later stage, cattle will doubtless eat less, and some infer from this, that it will "spend better;" but the true reason why they eat less is, because the system can digest and assimilate less. The actual benefit derived from hay is in proportion to the available nutriment contained in it.

There are other considerations, however, than simply the amount of nutriment, which should be taken into consideration in determining the preferable time to cut grass, as the use to which it is to be put. Many believe, that if designed for milch cows, it might be cut earlier than if for working oxen. The fact, that early cut hay is more palatable and better relished than late cut, should be an inducement, where all cannot be cut at exactly the best time, to begin in good season.

The difference between hay and straw, lies chiefly in the fact, that in the latter, most of the virtues of the plant have concentrated in the grain, and while, if this is to be used for seed, we cannot improve upon nature's process of ripening, and so do well to let it mature thoroughly in the field, we know that wheat cut before it is ripe, shows a handsomer kernel and makes better bread than if allowed to stand until perfectly mature.

Another reason for early rather than late cutting is, the increased quantity of aftermath. Allowing that with some grasses, the seed crop contains more nutriment than the flowering crop, the rowen obtainable, may, and we know often does, more than outweigh the

difference. One other consideration should be mentioned: the desirableness of leaving the plant when cut in the condition promising the greatest future usefulness. Many species of grasses may be cut with impunity at any stage; but as already noticed, with regard to Timothy, (Herdsgrass,) page 84, and such may possibly be the case with some others, there seems reason to believe that unless a certain stage of maturity be reached, the bulb or tuber at the bottom, may be weakened, and if drouth follows, perhaps killed. But in this connexion, it should not be forgotten, that in all herbaceous vegetation there is a tendency to die, wholly, or in part, on the production of seed. Thus annuals die at once, when they have attained the end of their growth, namely, seed for the reproduction of their species; and in many of them their duration may be continued for an indefinite period, by preventing this consummation. It is a common practice among gardeners in cultivating the annual mignonette, when a durable plant is desired, to deprive it of its flower-buds, as often as they appear. By so doing, the plant assumes the appearance of a woody shrub, and will live for three or four years, dying, however, after being allowed to produce seed.

Winter wheat which has been repeatedly cut down during its first summer's growth, has been known to survive the following winter and to produce a tolerable crop the summer after. The results of such experiments show that not allowing seeding in due season has a tendency to prolong the duration of life in plants; and it is upon this principle that by pasturing meadows they will maintain a continuous production of herbage, when were they cropped for hay they would fail, and this the more rapidly in proportion as the grass was older before being cut. So that, as a general rule, it is bad practice not to make hay early. Otherwise what is gained in quantity is mostly prejudiced in quality, and the after consequences are always unfavorable, circumstances arising not solely from the impoverishment of the soil.*

I have dwelt upon the proper period for cutting, longer than otherwise might seem expedient, partly from a conviction that in the State at large far greater loss is sustained by too late than by too early cutting, and partly in view of the fact that improved facilities

* Buckman.

for harvesting enable the farmer better than formerly to choose his time.

When an acre can be cut in an hour which formerly required the best part of a day, and raked with a proportionate saving of time, it is evident that this subject assumes a greater importance than when, however well he might be advised as to the best time, he was compelled to lose considerably at one end or the other, not to say at both.

The nutritive value of the different grasses compared with one another is a subject of great importance, and one which has received much attention. Its study either by the aid of chemical analysis or by actual trials in feeding, is beset with difficulties. Every good farmer can understand how the age, condition and temperament of an animal, and the treatment in other respects than that of feeding, together with a thousand other circumstances difficult of accurate estimation, might vary results; and the great discrepancies in the nutritive values of various vegetable foods as assigned to them by different authors who base their statements upon feeding experiments, also show that there is abundant margin for fallacies to creep in, by this mode. Every good chemist, too, is ready to admit that his utmost skill and care will not unfrequently give results widely differing from those obtained from actual feeding. The labors of both have not been without a degree of practical value, and as science and practice never advanced more rapidly than now, or were so willing to walk hand in hand, we may hope that by and bye, through the united labors of the feeder in the stall and the chemist in his laboratory, we may attain much greater light, and reliable results by which we may be safely guided.

The first extensive and careful experiments which threw light upon this subject, were instituted by the Duke of Bedford, and carried out and published under the superintendence of Mr. George Sinclair, in 1824. The method then adopted to ascertain the nutritive value of any grass, although directed by Sir Humphrey Davy, and the best which chemical science at that comparatively early day could give, was exceedingly imperfect. It was simply this: submit the grass to the action of hot water till all its soluble parts are taken up; then separate the liquor, and evaporate to dryness. The product of solid matter was deemed the nutritive matter of the grass.

Subsequent to this, Boussingault, an eminent German chemist, attempted to establish by a more scientific mode, a theoretical table of the nutrition of articles of food, founded on the amount of nitrogen they contain; (because the nitrogenous or flesh-forming constituents in food, being the most important and most expensive materials, their determination affords a better basis for forming an approximate estimate of the entire relative value of articles of food than the determination of the fat, or heat, or bone producing constituents;) but when he came to test by this table, their practical value, he found it to be, in many cases, at variance with the experience of acknowledged good farmers and feeders, and confessed that the amount of nitrogen in a food must be regarded as one factor only, though a very important one in estimating the nutritive equivalent.

More recently still, Prof. Way has made extensive and minute investigations, and his results are undoubtedly the nearest approximation to accuracy which have yet been obtained. His chief inquiries were, to ascertain,

First, The proportion of albuminous or flesh-forming substances; that is to say, all which contain nitrogen, and which when digested, go to form the muscles or flesh, and cartilages, and to repair the constant waste which goes on in the animal system;

Next, The proportion of oily or fatty matters, which so directly tend to increasing the fat of the system; also the proportion of heat producing principles or elements of respiration, as sugar, starch, gum, &c., containing no nitrogen, but which are used in sustaining animal heat, by furnishing carbon, and if not wholly needed for this, assist in the formation of fat;

Next, The proportion of woody fibre; (inert and worthless;) and

Lastly, The amount of mineral matter or ash, a portion of which goes to the formation of bone.

The researches of Prof. Way, covering as they do, all the different classes of constituents, and having been conducted with great skill and scrupulous care, may justly be deemed of great value, and relied upon with considerable confidence.

The results of his analysis of some of the natural and artificial grasses, are as follows:

Analysis of Grasses. One hundred parts as taken from the Field.

	Water.	Albuminous or flesh forming constituents.	Fatty matters.	Heat-producing constituents.	Woody fibre.	Ash, or mineral matters.
Meadow Foxtail,	80.20	2.44	.52	8.59	6.70	1.55
Sweet Scented Vernal,	80.55	2.05	.67	8.54	7.15	1.24
Tall Oat Grass,	72.65	3.55	.87	11.21	9.37	2.36
Orchard Grass,	70.00	4.06	.94	13.30	10.11	1.50
Hard Fescue Grass,	69.33	3.70	1.02	12.46	11.83	1.66
Perennial Rye Grass,	71.43	3.37	.91	12.08	10.06	2.15
Italian Rye Grass,	75.61	2.45	.80	14.11	4.82	2.21
Timothy Grass,	57.21	4.86	1.50	22.85	11.32	2.26
Annual Spear Grass,	79.14	2.47	.71	10.79	6.30	.59
June Grass,	67.14	3.41	.86	14.15	12.49	1.95
Rough Stalked Meadow Grass,	73.60	2.58	.97	10.54	10.11	2.20
ARTIFICIAL GRASSES.						
Red Clover,	81.01	4.27	.69	8.45	3.76	1.82
Perennial Clover,	81.05	3.64	.78	8.04	4.91	1.58
White Clover,	79.71	3.80	.89	8.14	5.38	2.08

Analysis of grasses. One hundred parts of the grass dried at 212° *Fahr.*

	Albuminous or flesh forming substances.	Fatty matters.	Heat-sustaining substances.	Woody fibre.	Ash, or mineral matter.
Meadow Foxtail,	12.32	2.92	43.12	33.83	7.81
Sweet Scented Vernal Grass,	10.43	3.41	43.48	36.36	6.32
Tall Oat Grass,	12.95	3.19	38.03	34.24	11.59
Orchard Grass,	13.53	3.14	44.32	33.70	5.31
Hard Fescue Grass,	12.10	3.34	40.43	38.71	5.42
Perennial Rye Grass,	11.85	3.17	42.24	35.20	7.54
Italian Rye Grass,	10.10	3.27	57.82	19.76	9.05
Timothy Grass,	11.36	3.55	53.35	26.46	5.28
Annual Spear Grass,	11.83	3.42	51.70	30.32	2.83
June Grass,	10.35	2.63	43.06	38.02	5.94
Rough Stalked Meadow Grass,	9.80	3.67	40.17	38.03	8.33
ARTIFICIAL GRASSES.					
Red Clover,	22.55	3.67	44.47	19.75	9.56
Perennial Clover,	19.18	4.09	42.42	25.96	8.35
White Clover,	18.76	4.38	40.04	26.53	10.29

The harvesting of hay is one of the most important operations which the farmer is called upon to undertake, and requires for its successful accomplishment, great activity and industry, close attention and skillful management.

Of the time when it should be cut, we have already spoken. Of the hight at which it should be cut, it may suffice to say that this should vary according to circumstances. Where the meadow is chiefly of well grown herdsgrass, (Timothy,) and the season hot and dry, it is not deemed safe to cut closer than below the second joint, (see pages 84–85,) but where other grasses chiefly prevail, and especially if the meadows be partially exhausted and the crop light and fine, and the season a moist one, it may well be cut much closer, leaving perhaps as little as may be. Wet meadows or swales, yielding what is called "fresh hay," and upland meadows, receiving a top-dressing soon after, may be cut very closely.

Grass, in its best estate, being universally acknowledged to be unsurpassed for food, and being incapable of preservation on account of the amount of water it contains, the problem in hay-making at first blush would seem to be, how to deprive it of water in the easiest and quickest manner, to an extent sufficient to enable it to be stored with safety; and the answer which most naturally suggests itself to this is, to expose it as fully as possible to drying winds and sunshine; but in practice this method is found to result in a hardening and brittleness of the stalks and leaves, and a loss of sweetness, flavor and aroma. The deprivation of water is not the only point to be considered. In grasses at the proper stage for cutting, we find the nutritive juices to hold much sugar, gum, vegetable albumen, &c., which are capable of undergoing certain spontaneous changes, in regard to the nature of which we are very imperfectly informed. One of these, the process of fermentation, is one of the most obscure of all chemical processes, but happily although science may not yet be able to explain fully all which occurs, practice has not left us ignorant of its results.

It is a well established fact that a partial sweating of grass is needful in the process of curing, in order to develop and secure the best properties of good hay. It is also important that this should not be violent, but gentle and gradual in its progress, and that it be

arrested at the proper stage, as otherwise the changes attending it would result in damage and loss. In such sweating, which is a partial fermentation, there take place many different chemical changes, which together with their effects are more fully set forth than I have ever seen elsewhere, in a communication received from Dr. Samuel L. Dana, well known as a distinguished chemist, in reply to a note of inquiry touching this matter, and which is as follows:

"Growing grass is a mass of ferments and fermentable principles, combined with neutral substances and mineral matters. By ferments, I mean matter capable of exciting fermentation. By fermentation, I mean a change in the state of a body attended with production of carbonic acid and alcohol. By fermentable principles, I mean bodies capable of undergoing fermentation; or simply a change without loss of substance. By neutral principles, I mean fatty and waxy matter. By mineral substances, I mean the earths and salts, which form the ash of burned grass.

The elements above enumerated form the skeleton of the grass, which is clothed with green drapery, composed of a neutral substance, which like the coloring matter of blood contains iron as one of its components. The whole plant is rendered plump and soft by an excess of water—the sap of the vegetable.

The ferments are composed of four chemical elements—carbon, oxygen, hydrogen, and nitrogen. They form a distinct group, composed of albumen, gluten, &c., united to sulphur and phosphorus.

The fermentable matters also form a distinct group of well defined vegetable principles, all connected by a common bond, and behaving much alike under similar circumstances. This group comprises:

1. Woody fibre.
2. Starchy matter.
3. Gummy matter.
4. Sugary matter.

These are composed of carbon, hydrogen and oxygen, only the last two being in just the proportion to form water.

5. Jelly matter composed like the above, but with oxygen in excess.

If the members of these two groups were in a perfectly dry state, no change would occur. They are capable of acting on each other

only in the presence of air and moisture. This is the condition of freshly cut grass, free from dew or external wet.

The question then presents itself, what are the changes occurring in hay-making.

1. The ferments begin, almost as soon as life ceases, to act on the sugary matter. This is changed by a true fermentation into carbonic acid and alcohol, accompanied by various ethers and essences—dependant on the peculiarity of the ferment. This last always undergoes change during its action on fermentable matter. Both lose weight from the escape of gas.

2. The starchy matter cannot ferment like sugar. Certain albuminous ferments rapidly convert starch without loss of substance into gum, and ultimately this into sugar. This is effected by diastase, a substance produced by fermentation. Hence malt quickly changes the starch into gum and sugar in the brewer's mash.

Starch is also changed into gum and sugar, by the long action of weak acids, even by very weak vinegar, but we have no evidence that carbonic acid evolved during fermentation so acts, nor that vegetable acids, existent in plants, change starch to gum and sugar, as they promote the conversion of sugar into alcohol.

In *wet* hay, it is possible that the starch swollen by previous heating may be converted to gum by exposure, an effect well known to be produced on starched clothes in damp weather. They iron limpsy.

3. Gummy and jelly matters—these change not. Gum is already food in a soluble state, but by prolonged wet, the gum becomes acid.

4. The woody fibre will undergo no change in hay-making, unless by prolonged wet. In this case, ferments act on it, and it undergoes change with loss of substance.

5. The neutral bodies—fat, wax, and the green drapery suffer change by converting grass to hay, even in the most favorable weather. I do not know the nature of this change. It is quite obscure. It is connected no doubt with the formation of alcohol and ethers, during the fermentation of the sugar, and is attended by a loss of fat and wax.

6. The mineral matters change not in hay-making so as to cause any loss of substance.

These various changes occur in curing in the best manner grass into hay. There is in this case, a certain loss of substance. Each

species of grass loses in proportion to its amount of ferment and fermentable matter, modified by the amount of sap, and by the weather. It is certain, cure hay how you may, that a loss of vegetable substance occurs. Experiments are yet wanting to determine if grass rapidly dried by artificial heat, preserves its nutritive powers unimpaired. If so, then artificial drying would require the dried grass to be pressed like screwed hay, to exclude air and moisture; for the best dried grass is greedy of the last. If it becomes moist, loss will occur. This loss is due chiefly to the change of sugar into carbonic acid, alcohol and volatile essences—the ethers derived from alcohol. This occasions a loss of actual nutriment. All we get in return is apparently the smell of new made, or making, hay. But this is more than the smell of a dinner, which you know was decided long ago to equal the jingling of money. This odor, the aroma of new hay-making in the cock, is probably worth more than the weight of the lost substance. I believe it is the result of experience, that all cattle eat hay, which has given off its odor by *sweating* in the cock or mow, better than that which has not undergone that process. Hence if artificial drying were practicable, it would not be advisable. So a bright, hot sun, shining in an atmosphere whose degree of moisture is far below saturation, rapidly dries grass, without making it into hay. If this sun-dried grass is cocked up, it rarely sweats and fills the air with its grateful fragrance.

In all its relations, sugar is the most active cause of the loss of weight and nutrition in hay-making. The amount of loss depends on the amount of sugar and the activity of the fermentation. After the alcoholic production has ceased, if the hay is damp, then the alcohol is converted into various acids, as the ferment becomes acid or alkaline.

Very little loss is due to any change on starchy matter. It is merely converted from an insoluble to a soluble state, from starch to gum, probably without loss of nutritive power.

Still less loss is due to gum-changes. Gum may become sugar by the action of ferments; but this change is not probable in hay-making. The loss then would be consequent on the production of alcohol.

The loss of fat and wax, in connection with formation of alcohol, has been alluded to. These escape volatile in part, and next to sugar, are the most prolific sources of loss. But the fat and wax

are by hay-making rendered more soluble by drenching rains or cold water. In this connection it may be worth while to ask, how these changes in hay-making affect its liability to injury from weathering and rain.

Of course the sugar and gum will be washed out, and so will the starch in proportion as it has been changed to gum. The action of moisture on starch has already been noticed. The chances are that hay will lose more by a drenching rain than by gaseous exhalations. By repeated rains, hay loses twenty per cent. of its nitrogen, and a total loss of thirty-six per cent. of its weight. Of its ash parts, it will give up to cold water about nine-tenths of its potash and soda, one-half to three-fourths of phosphorus, one-third to one-fourth of its lime. Magnesia and silica are also washed out. The practical lesson from all this is, get rid of the moisture of grass as rapidly as is consistent with the aromatic fermentation, then as far as possible exclude air and wet."

The effect of fermentation in causing changes to take place in vegetable products is forcibly illustrated in the case of several dye-stuffs, as indigo, litmus, woad, &c., none of which could be obtained from the several vegetables supplying them without the aid of fermentation. We know too that the tobacco of commerce does not consist simply of the dried leaves of the plant, but is an article in the manufacture of which a degree of fermentation could not be dispensed with.

The drying of grass in order to the best product of hay, should be gradual, and conducted with as little direct exposure to the sun's rays as may be. The proverb, which instructs us to "make hay while the sun shines," has its weak as well as its strong side. The experience of ages has agreed with no controversy whatever, that all medicinal herbs are better dried in the shade, and if so with medicinal herbs, why not equally so with nutritive herbs. This it is true cannot be fully accomplished with the hay crop, but the method of curing in swath and cock is a near approach to it. This method has long been in use for clover, but while more imperatively necessary for this and for coarse rank herdsgrass, it may be adopted with very decided, if not with equal benefit to the great bulk of hay cured. The preferable mode in all cases, is believed to be to let the grass lie as it falls, if cut by the mower, or if a heavy crop and cut

with the scythe, spread somewhat, *until thoroughly wilted*, then while yet warm, let it be raked and put in cocks of sufficient size to take on a sweat, at the same time not so large as to induce rapid or excessive fermentation in case the weather proves too wet to allow its being opened. If thus put in cocks, when only thoroughly wilted, (not dried,) and these of moderate size, and then *let alone*, there is little probability of serious injury from fermentation, while if rain falls, and it be let alone, it is probably less liable to injury from this course than if left in any other way. If, on the other hand, the weather proves dry, we may be sure that while the first sweating goes on, moisture is evolved from the inside of the cock as well as from the outside. A thickening of the juices takes place with a good degree of uniformity throughout the mass, and in most cases, if opened the next day, a comparatively short exposure will suffice to fit it for carting home. It seems scarcely necessary to say that hay in the process of curing should be sedulously guarded against rains and dews, and this the more so, as it approaches a state of fitness for the mow. If the soluble portion be washed out by rain, what remains is little better than indigestible woody fibre.

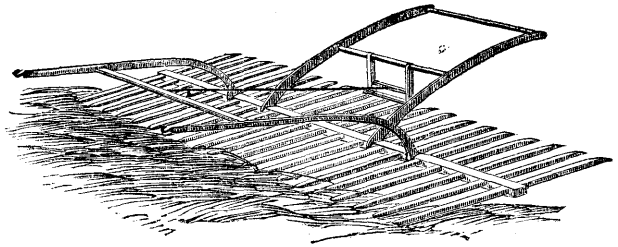
A point which seems less understood, and upon which, particularly in a season so remarkably favorable as the past, there is danger of erring, is the liability to dry hay too much. The degree of dryness needful to insure the best quality, is just so much as will save it from injurious fermentation when stored. If so dry that it does not settle to a good degree of compactness in the mow, we may be sure that it has passed the best stage. I have seen many mows this year into which the hand and arm could be thrust, with perfect ease, its whole length, and doubtless much farther, were the arm longer. Critical observation will enable one to determine the proper stage of dryness with tolerable accuracy. If over-dried, there is a brittleness or tendency to crumble upon handling, which sufficiently indicates the fact.

To no other source has the New England farmer to look with greater confidence for aid in his calling, than to the mechanical ingenuity of his countrymen, which may produce implements or machinery capable of economizing or rendering more effective human labor. The agriculturist, formerly slow to perceive that any change was necessary in the modes of culture or in the tools used by his

fathers, now realizes that changes may be made which shall be greatly to his advantage. True, all changes are not improvements, and no one more than the farmer has need to be cautious in adopting every new thing which is offered as a labor-saving implement, or as a wonderful improvement of any kind,—too often has he been sadly humbugged and spent his money for what was neither bread nor would help him earn his bread; but if there were really no improvements, there would be no pretence of any, and we have but to glance at the transformations which have taken place within the memory of man in the implements at present in use, to see that great gain has been effected.

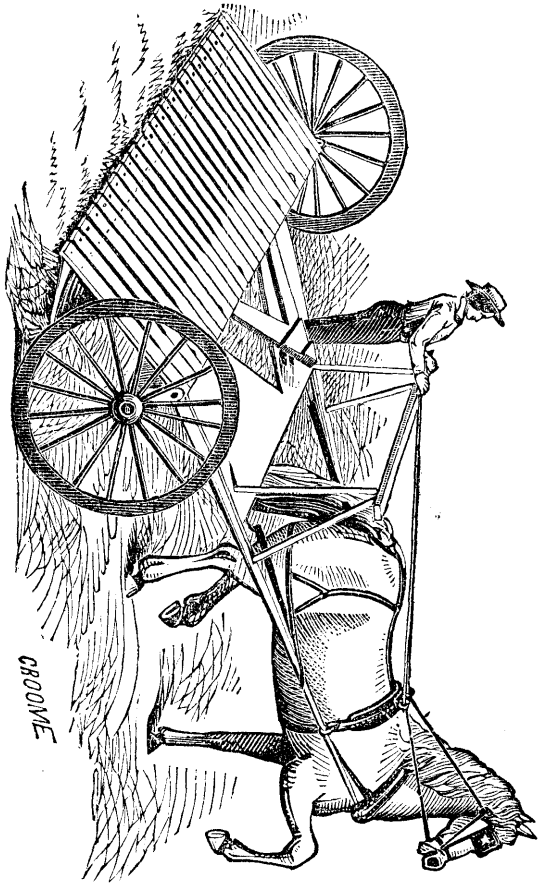
In no department of industry is the ingenuity of the mechanic more busy, than in that of agriculture. The reports of the Patent Office furnish the gratifying information "that the greatest number of patents applied for and issued of any one class, are connected with agriculture, and the fewest with that of war," and this in the proportion of ten to one. We may safely ascribe this in great measure to the increasing scarcity of farm laborers and the higher price of labor, together with a growing appreciation in the minds of farmers of the need of employing any machine or implement which shall prove itself labor-saving and economical. It is an omen of good. When farmers' sons come to realize that science and art are ready to contribute to their necessities, and that by "gearing mind to matter," they may earn a comfortable livelihood without becoming mere drudges, plodding forever a toilsome beaten track, but reserving time, not for luxurious idleness, but for mental improvement, and may thus assert for themselves and for their profession the position in the estimation of the world which the Almighty has decreed to them, they will be less prone than now, to leave the homestead and business of their boyhood for the glittering and deceitful prospects of city life.

Mechanical ingenuity has done as much and probably more, towards lightening the labors of the hay harvest, than towards any other department of agricultural labor. The horse-rake and mowing-machine, where they have been introduced, have wrought a revolution in hay-making. The former, from its simpler construction and more moderate cost, compared with the latter, has come to be very generally used and its advantages to be as uniformly admitted.



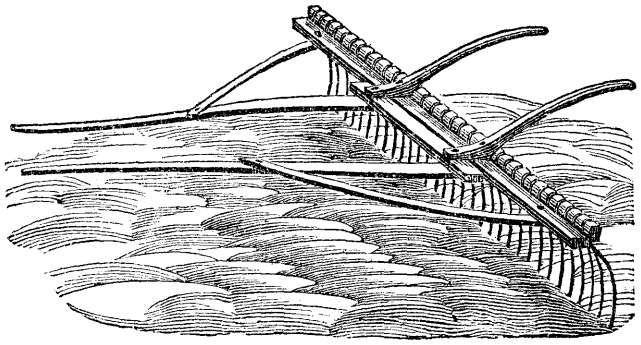
Revolving Horse Rake.

Judging from the replies to my circular of last spring, it would appear that the revolver is preferred by many farmers as doing good work easily, with all kinds of grass, upon smooth fields, while others whose fields are rough or encumbered with more or less



Delano's Independent Horse Rake.

obstructions, find the independent or wheel-rake much more satisfactory. The estimates furnished me by practical farmers, as to the saving effected by the use of the horse-rake, varies so much, viz: from a third to three-fourths, as to suggest a great difference of value in the implements used.



Spring Tooth Horse Rake.

The spring tooth horse-rake is, by some farmers, considered a desirable instrument upon new and rough grounds. It requires considerable strength to be applied by the holder, and is more liable than the above named to collect bits of loose turf, dust, &c., among the hay.

In what I may have to say about mowing-machines, it will be no part of my object to attempt to prove that any one is better than all others, or that any are perfect, or so good, or so cheap, as they probably will be a few years hence; but rather to state my conviction, and if possible, to enforce it as a fact, that the best machines of to-day, are so good and so cheap, that no farmer, who cuts fifty acres of grass upon land in tolerable condition for a machine to work upon, can afford to forego its advantages, even if he be obliged for this alone to become the owner of one. Nor is this always necessary, for in every neighborhood some one can be found of more than usual mechanical ingenuity and fitness, to use a mower, who might be entrusted with one purchased with the joint funds of several, and cut the grass for each, to the mutual benefit of all. Mowing-machines are not so great a novelty as some suppose. Many years ago, attempts were made in England to construct machines for mowing and reaping by horse power; but these first attempts generally met with very indifferent success. About 1805, Samuel Adams of

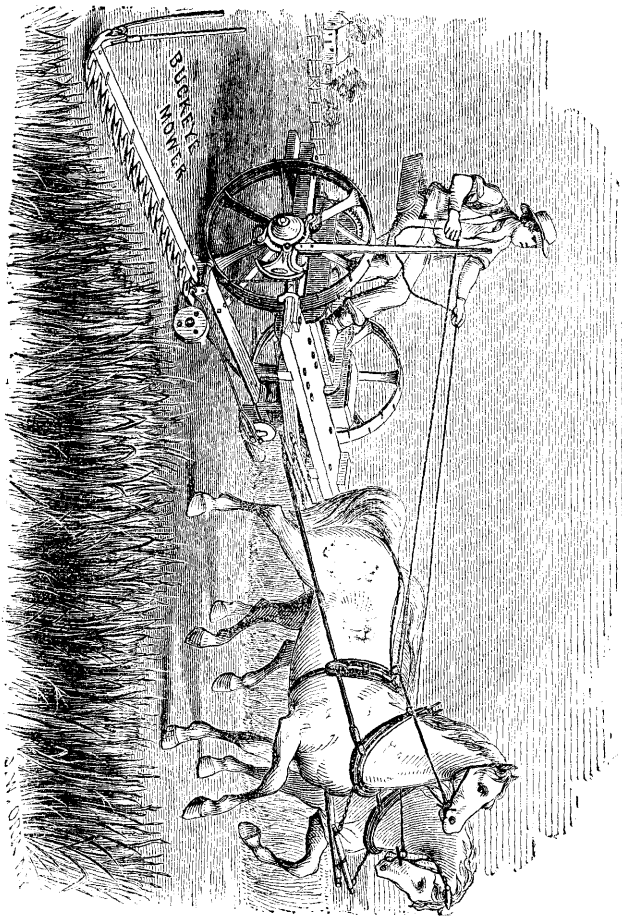
Kingston, Mass., invented and patented a machine, which however, failed to come into much use. About 1830, William Manning of New Jersey, invented a mower, and a few years later, the Ambler patent came out, both of which proved partially successful. About fifteen years ago, Hussey's reaper, and soon after, McCormick's, made their appearance. Within ten years, both mowers and reapers have greatly multiplied; improvements have succeeded one another with great rapidity, until at the present time, we have, beyond any doubt, several machines amply capable of relieving the farmer of a vast amount of the severest and most fatiguing labor connected with the farm, by substituting brute power at an economical rate in place of human muscles; nor are reliefs from exhausting labor and economy in the cost of cutting grass by any means the only advantages which these machines offer the farmer, for they enable him to cut his grass just when in its best condition, and so effect a very material increase of the value of his product over what it would be, if dependent entirely upon the manual labor usually at his command.

It should not be forgotten also, that the labors of farmers' wives, always sufficient to keep them busily employed, are often at the season of haying, so increased by the employment of a gang of extra hired hands, as to be seriously onerous and too often beyond their ability. Farmers' wives in Maine, have at best, a weary burden of care and labor. True, they do not, as in some other countries, labor in the field, (doubtless more open air exercise would be beneficial, and would be indulged in too, *if only they could find time for it*;) but including all—the physical labor, care and responsibility which is imposed upon, or assumed by, or some how or other by common consent, devolves upon them, nowhere in the world are women more severely tasked than they; and whatever may lighten their burdens, be it a sewing-machine or a mowing-machine, deserves attention—certainly from every husband and father.

Among the mowing machines which have been successfully used of late in this State, I present herewith, illustrations and descriptions of several, as offered by the proprietors.

Buckeye Mower.

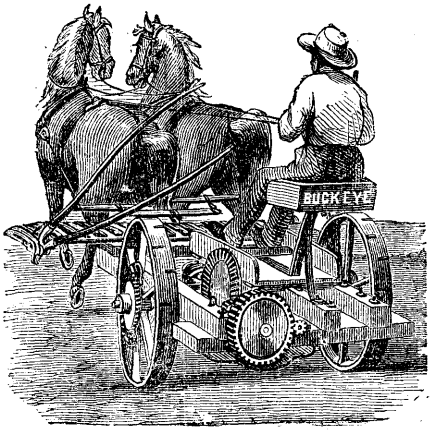
Of this mower, the proprietor, John P. Adrianne, 165 Greenwich street, New York, and Worcester, Mass., in his circular, says:



The Buckeye Mower as it appears in the Field.

"Its peculiar construction commands universal approval; the frame being supported on the two driving wheels, and the cutter bar attached to the frame by a double hinge joint, the cutters conform to the surface of the land independent of any working of the frame, either end of the bar being free to rise or fall without affecting the other.

The cutters are easily raised to pass obstructions by means of a lever at the right of the driver, and when so raised there is nothing outside of the driving wheel to obstruct the passage of the machine. *When not in use, the cutters can be folded over on the front of the frame in such a manner that the machine can be driven any distance*



As it appears on the road.

on the road. This feature belongs exclusively to this machine; and, besides its compactness, the convenience of having a machine always ready, or that may be made ready in less than a minute, for driving off one mile or more, is worthy the consideration of every farmer.

It is light draft,—a team weighing nine hundred pounds each, being sufficient to cut and spread an acre an hour, and work ten hours a day. It has no side draft, no weight on the horses' necks, and backs with the ease of a cart; the knives ceasing to vibrate while the machine is backing. It is almost noiseless in its operation; works well on any ground, side hills or salt meadows, and in any grass, whether lodged or standing. It will cut well, at a slow speed of either horses or oxen, and can be operated by a farmer's boy who can drive a span of horses. Among its numerous points of excellence are the following:

1. It is a two-wheeled machine—the wheels supporting the frame are both driving wheels, and operate together or independently, as required in driving the knives.

2. By the use of two driving wheels, you can make short turns to the right or left, without clogging or stopping the knives, which cannot be done with machines having but one driving wheel.

3. Instead of cogs, each driving wheel has two palls which work into rachets and drive the gearing.

4. The palls are so constructed as to be held in or out of gear by the spring.

5. The knives never work when the machine is backed, and it takes no more power than to back an empty cart; this is an excel-

lent feature, and prevents injury to the knives when a small stone or other obstruction gets caught between them and the fingers.

6. The cutter bar is attached to the frame by a double hinge joint, which allows it to follow the surface of the land, without being affected by the working of the frame, and over knolls, ridges and through hollows, the independent action of the cutters is perfect—either end of the bar raising without affecting the other—and at no time has it to sustain the frame and gearing, as is the case with machines where the bar is rigidly attached.

7. The cutters are easily raised to pass obstructions by means of the lever, which is always under the control of the operator.

8. The cutter bar is in front of the driving wheels, and the seat in the rear, thus enabling the driver to see the operation of the cutters without interfering with his driving, and avoiding those dreadful accidents which frequently occur when the seat is directly over, or a little in advance of the cutter.

9. The gearing is all permanently arranged in the centre of the frame, distant from the driving wheels, thus avoiding all tendency of its being clogged up with mud or dirt.

10. The cutter bar being attached to the machine by means of *hinges, can be folded up on the top of the machine without removing connecting rod, knife, or track clearer*, as will be seen in the engraving.

11. The palls on the driving wheels can readily be thrown out of gear, and, by folding the cutter bar as above stated, the machine becomes as portable as a common cart.

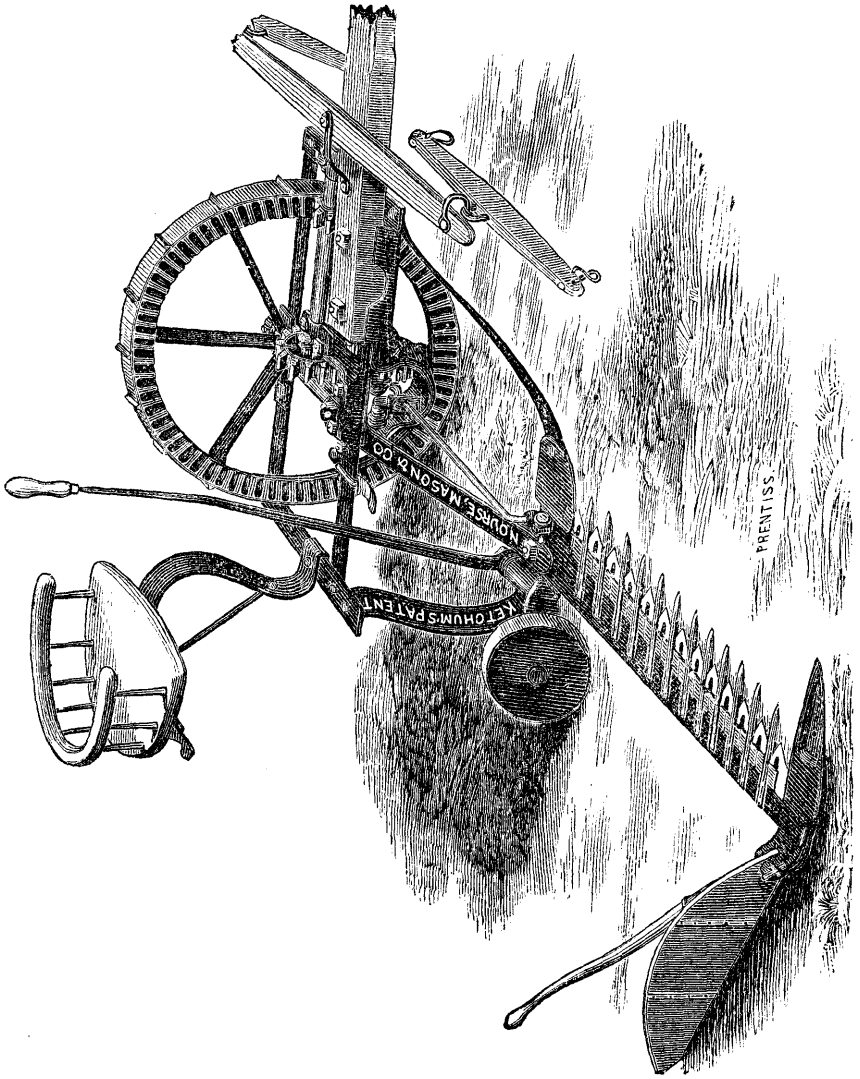
12. There is a wheel on the shoe next the gearing, in front of the cutter bar, thus avoiding all tendency of clogging at the near shoe, in passing over cut grass.

13. The off shoe is only two and a half inches wide, and the last knife cuts no more than any other, therefore leaving no ridge or high stubble at the end of each swath.

14. The cutter bar can be raised or lowered by means of an adjustable steel spring shoe at off end, and adjustable wheel at the inner shoe."

J. F. Anderson, Esq., of South Windham, writes me of this: "I am just as sure that the Buckeye is the best machine as every other successful operator is that the one he owns is the best. I am sure it is the most convenient to move around, from its having two bearing wheels and the folding bar. Mine has been over the road from one end of this district to the other. I did not get it until half through

the past haying season, yet it earned me $60, reckoning my own at the price paid by the others, viz: (75 cents per hour.) I worked it the first day with oxen, and could stop and then start, cutting at once with so slow a team. The grass dries a third quicker from its being so evenly spread. I believe, too, there may be obtained a greater amount of hay per acre, with less injury to the roots, from its cutting so evenly."



Ketchum's Improved Mowing Machine.

The circular of Nourse, Mason & Co., reads as follows:

WORCESTER, MASS, JUNE 1st, 1859.

"After four years' experience in the manufacture, sale and use of Mowing and Mowing and Reaping Machines, we are convinced of the practical utility of cutting grass, even on most of the lands in the New England States, by the application of machinery, worked by horses or oxen. From recent improvements added to Ketchum's Mower, enumerated below, we believe that it is now the most perfect mower in use, and better adapted to uneven surfaces than any other machine manufactured. We can recommend it without any fear or misgiving, and do honestly believe that it is *the machine* above all others, to cut grass or grain with the *least draught*, the *greatest economy* and *the greatest success*. We invite your particular attention to the *lever* and *wheel* which have been added to Ketchum's machine, as having advantages over all other machines; and the ease with which the driver can, while sitting in his seat, raise the finger bar instantly, to pass over stones, or any obstructions, or moving to and from the field. The following are among the many points of excellence of Ketchum's Machine, as manufactured by us.

1. *Easy Draught* is attained, without any loss of momentum and power, which are essential in order to cut grass under all circumstances.

2. *The Machinery and Gearing* is so simple that any person can understand and manage the machine.

3. *Great Strength* is attained in every part, a feature which is indispensable in machinery to be used in rough field work.

4. *Durability* is an important feature, as none but cast and wrought iron of the very best quality is used.

5. *All Side Draught* is obviated by placing the pole in the centre of draught as near as possible.

6. *The Open Knife or Hole in the Knife Sections*, is one of the most valuable patents to prevent clogging, and belongs exclusively to the Ketchum Machine.

7. *The Location of the Finger Bar*, below the frame, and on a line with the shaft of the main wheel, secures a uniform cut, and causes the finger bar to follow the tread of the wheel over uneven ground.

8. *The Open Space* between the heel of the cutters and the main wheel, secured by an arrangement which is patented, prevents the clogging of the machinery by the cut grass on the return swaths.

Other machines have a dead point here, shoving and piling up the grass in front, or riding over it and raising up the finger bar, and some, infringing Ketchum's Patent, secure this same space, so important, by locating the finger bar before or behind the main wheel, although it is apparent that a location on the line of the shaft secures many advantages not otherwise attained.

9. *The Shield Plate,* or extension of the shoe upward and forward from the heel of the finger bar, is important to equalize the draught and prevent the cut grass from piling up in front of, and clogging the machine. This is patented by Mr. Ketchum, and belongs exclusively to the Ketchum Machine.

10. *The Hinged Track-Clearer* upon the outer end of the finger bar, also patented by Mr. Ketchum, is of great importance in cutting heavy grass, to separate the cut from the uncut grass, and to prevent clogging.

11. *The Wheel and Lever* attached to the inner shoe, ingeniously arranged, so that the driver can, while sitting in his seat, instantly raise the finger bar for the purpose of passing over obstructions, backing, &c. This has been very much needed.

12. A very important improvement in this machine is, that it can be instantly thrown *out of or into gear,* by means of a short lever, which can be operated with ease by the driver on the seat.

13. *The Finger Bar* is made of wrought iron, of the proper width to prevent the cut grass from lodging thereon, and the grass is ALWAYS EVENLY SPREAD.

14. *The Height of the Cut* is readily adjusted by means of the pole bolts.

15. *An equal Balance* of the machine is always maintained by means of the seat and other arrangements, so that the machine will not tip over, and will always bear lightly upon the team.

16. One person, and even a boy, can easily manage Ketchum's Machine. Many others, particularly in heavy grass, require two persons.

17. *The Speed of Team Required,* is an ordinary walk of common farm horses.

After repeated and long continued experiments, in the field and manufactory, the proprietors have succeeded in producing a one horse mowing machine, which for simplicity of construction, lightness of draft, ease of operation, and the low price at which it is sold, must recommend itself to every New England farmer.

Ketchum's One-Horse Mowing Machine.

The machine is so constructed as to combine great strength and durability with the smallest possible weight; the cutters are so formed as to prevent entirely the liability to clog, so troublesome in some machines; it may be stopped and started in wet or lodged grass, without backing; the seat is conveniently placed, so that the operator can ride with perfect ease to himself and the horse; it has a wheel and lever attached, by which the operator can instantly raise the cutter-bar six or eight inches, to pass over a stone or other obstruction, and while raised, the machine may be drawn to and from the field, &c. The cutter-bar being always on a line with the axis of the driving wheel, this machine operates well on rough or uneven ground, where other machines cannot mow. A very important improvement in this machine is, that it can be instantly

thrown *out of or into* gear, by means of a short lever, which can be operated with ease by the driver on the seat. The machine is constructed entirely of iron, and its parts so adjusted and guarded against accidents, that it requires but little more attention to keep it in working order than the common scythe.

Prices of Machines.

One Horse Mowing Machine,	$3\frac{1}{2}$ ft. Bar,	weight 450 lbs.		$75.00.
Light Two Horse "	4 " "	" 475 "		$80.00.
" " " "	$4\frac{1}{2}$ " "	" 480 "		$85.00.
Heavy " " "	4 " "	" 630 "		$90.00.
" " " "	$4\frac{2}{3}$ " "	" 650 "		$95.00.
" " " "	6 " "	" 660 "		$100.00.
Reaper attachment, extra,				$20.00.

Extras to each Machine—1 Scythe, 2 Knives, 2 Fingers, and Wrench.

Machines delivered at Boston and Worcester.

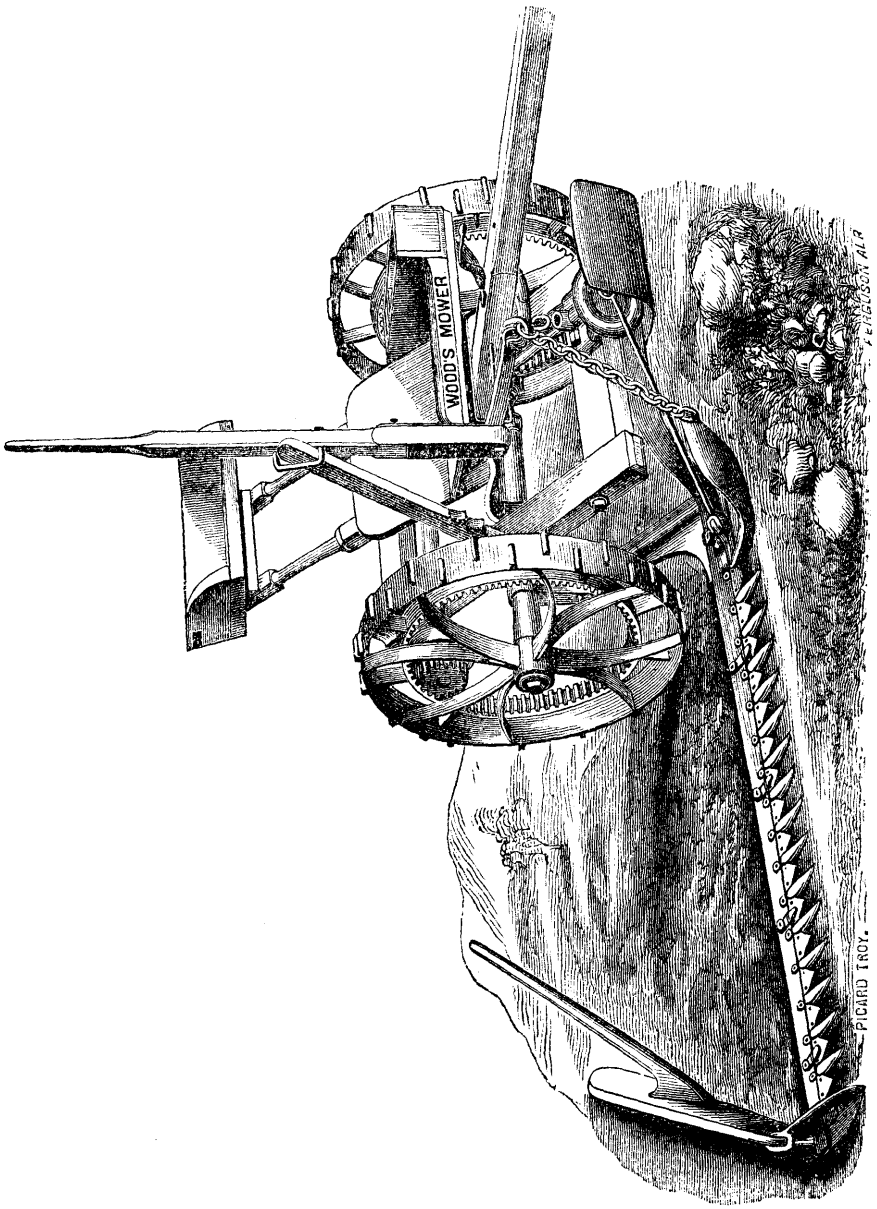
NOURSE, MASON & Co.

Worcester, Mass., 1859.

Woods' Mower.

Of this the proprietor says:

The success of this machine during the past harvest, the first it has been in use, is without a parallel in the history of mowing machines. Five hundred and eighty-eight of these machines have been made and sold by me this year. Farmers from all the grass-growing states of the Union have written me enthusiastically of their light draft and perfect cutting. I ventured to put so large a number into market the first year, from a full faith that I had, after many thorough experiments, attained the true mechanical and practical principles in constructing a mowing machine. My aim was to produce a mower of lighter draft that could be afforded to the farmer at a less price than any heretofore in use, and at the same time be light, durable, and do perfect work. It has performed all, and more than I claimed for it in the outset; and I now repeat, what I announced in my first circular, that my machine will cut a more perfect swath than any other mower made, and do it with one-quarter less power, as the report of tests herewith submitted will show. This is the first successful attempt to cheapen the price, and lessen the draft of mowing machines. The reduction in both is equal to twenty-five per cent. When my machine, weighing only four hundred and twenty-five pounds, was first placed on



WOOD'S MOWING MACHINE.
Patented February, 1859.

exhibition at the beginning of the harvest, farmers looked incredulous, and would hardly believe that so light and small machine

would mow heavy grass. But wise heads that shook ominously at the outset, looked a second time, wondered, and then believed. I adopted the principle that a mowing machine might be light, and at the same time strong; and that to be capable of doing heavy work, it need not itself be heavy.

I have added such improvements to the mower for 1860, as the experience of the past harvest has suggested to me; the most important of which is a lever arrangement for raising the cutter bar, and strengthening some of its parts. The mower is now complete and perfect in all its details. The usual number of knives furnished with a machine is two; the necessity for keeping the knives sharp, I think, requires that there should be three; this will enable the farmer to work through the forenoon without stopping to sharpen his knives, and after sharpening at noon to finish the day's work without interruption.

The price of the machine, the same as last year, $80, delivered on the cars at Hoosick Falls, including three scythes, four guards, four sections, one wrench and oil can. One horse machine, $70.

WALTER A. WOOD.

Hoosick Falls, September 1, 1859.

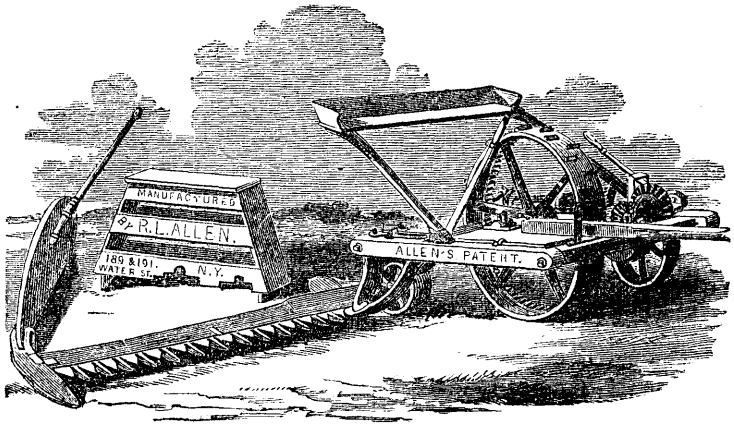
From a report of the judges, at a trial of mowers, instituted by the Duchess County Agricultural Society, New York, in June last, the following is quoted:

"WOOD'S TWO-HORSE MOWER.—A new machine, and much the smallest, lightest and cheapest, exhibited points well worthy the attention of all builders of mowing machines. The workmanship is excellent. It has two small driving wheels, has internal gearing, thereby giving additional strength—backs out of gear, is easily turned. The knives vibrate very rapidly, giving them a perfect cut. The fingers are very close together, making the knives less liable to dull. The finger bar is elastic and follows the surface well, whether rough or smooth, but does not fold like the Buckeye. The driver's seat is safe and comfortable, being back of the knives. Its draft is evidently very light.

Wood's one-horse machine is very similar to the above in construction, only lighter, and has a shorter cutter bar. It did its work to the satisfaction of all."

Mr. Hiram Russ of Farmington, writes me under date of August 1st. "This year I bought one of Wood's one horse mowers, and it

does the business up to a charm. I consider it the best machine out to my knowledge. Some years ago Manny's and Ketchum's machines were used for a while, but were abandoned on account of heavy draft and not cutting our fine intervale grass close enough. Wood's mower cuts snugger than any man I can hire."



Allen's Mowing Machine.

Of this machine, no detailed description has been received from the proprietor, R. L. Allen, New York, and I can simply say that it is claimed for it, that it is strong, simple in construction, not liable to get out of order, compact, light, easy of draft, safe for the driver, and may be worked at a slow gait, by either oxen or horses; works well on rough ground, side hills, fresh or salt grass meadows, and will cut lodged grass or clover.

In a reply to my circular of last spring, Mr. E. R. French of Chesterville, writes me:—"Last season I took one of Allen's two horse mowers on trial, and liked it so well that I purchased it. It is simple, strong and durable, not likely to get out of repair, and of as light draft as any machine yet introduced. I examined quite a number, including Wood's, Buckeye, and Manny's, in order to get the best, and am satisfied that taking into account its convenience and adaptability to all kinds of work, this excels all others, which have yet been introduced among us. Two horses of one thousand pounds weight, each, are sufficient for the heaviest work. Mine weigh less than nine hundred each. I think it pays me twenty-five per cent. yearly, on the cost."

Other machines have been introduced into this State to a greater or less extent, as Hallenback's, Manny's, &c. Of the latter, Mr. Joseph Frost of Elliot, writes: "We have used Manny's mowing machine for two years; have worked it with horses and oxen; and with one man and a good span of horses, it will in heavy grass do more work and do it better than four of the best men we can hire can do with scythes in the same time. With Manny's mower, the revolver and drag-rake, we estimate our expenses in harvesting hay at fifty per cent. less than it was before we went into the use of these tools."

Manny's machine is also referred to in the following communication from Samuel F. Perley, Esq., of Naples, late President of the Maine State Agricultural Society, and one of the most intelligent and thoroughly practical farmers in the State. It was written me in reply to a request for a leaf from his experience in the use of mowers, and is commended to the attention of any who are yet sceptical as to the utility and economy of these machines:

"My experience with mowers has been in this wise. June 30th, 1854, I purchased a Ketchum's mower, No. 4042, at a cost of one hundred thirty-four dollars ($134.) This machine performed its work well; left the stubble even, about the right length, and the grass well spread. But it was an ungainly thing to handle; wouldn't start without coaxing, wouldn't go without dragging, wouldn't back without lifting, would clog occasionally, especially if the wind blew fresh, and was a sad waster of horse-flesh, making no mention of galled withers. Still, with all its faults I used it three seasons, and found a profit in so doing.

July 28th, 1857, after a trial, I purchased a Manny's mower, No. 875, at a cost of one hundred and fifteen dollars. This machine has given almost perfect satisfaction. Two horses, weighing ten hundred pounds each, have run it in the hottest weather, at a speed of one acre per hour, without undue fatigue.

I find by six years experience that, in actual service, one man, two horses and a machine are, in an average of chances, in heavy and light grass, equal to five men with hand scythes, and one spreader, say six men. The work is better performed by the machine than by the most skillful hand mowers; the stubble being left even, none too high, none too low; and the spreading is more perfect than anybody's boy, or man, even, can do it.

By using the machine the crop can be harvested in less time, thereby enabling me to cut most of my grass when it is in the best condition. It diminishes the necessity for extra labor in the haying season; a season when, from the great demand, labor commands a high price, thus reducing the cost of the hay harvest. It is a relief to the most laborious part of haying, changing the burden from human to brute force, the change being rendered still more effective by the aid of machinery. And last, though not least, it is a great relief to the in-door department of the farm. It costs much less to board and lodge a mower constructed of wood, iron and steel, than its equivalent made up of blood, bones and muscles. The former is always "on hand" when wanted, the latter must sometimes be sought for.

I wish to disclaim, expressly, any intention, in the foregoing remarks, of "sounding a trumpet" for any particular machine, or patent. I found Manny's mower of 1857 better than Ketchum's of 1854; and I should expect *any* machine of 1859 to possess marked improvements over those of 1857. It is not to be supposed that mowing machines are yet perfect. Inventors, and manufacturers have done much, but farmers are expecting still more. A wider swath, without increase of draft is wanted. Also a practical one-horse mower for the farmer of ten to thirty acres of mowing.

A horse mower may be worked on land quite uneven and stony, so also may hand scythes, but it will be at the cost of extra wear of the implements, in either case, and is bad economy. Ground smoothly laid and freed from stones and other obstructions, is very desirable, though not absolutely indispensable, in the use of a mower as in many other tools.

Can mowers be employed upon the uneven, stony hay-fields of Maine? is no longer an unsolved problem. The only question now is, can they be used with a profit? I answer without hesitation, I believe they can. Every farmer in Maine who has thirty, or more, acres, mostly cleared of stumps and rocks, would, in my opinion, act wisely in procuring, at once, a mower. The rattle of fifty machines should greet the ear in many towns in the State, during the hay season of 1860, where only a solitary one was heard in 1859. Undoubtedly manufacturers are realizing large profits from their machines at the present high prices, and those prices must soon be reduced, but farmers cannot afford to wait for this. Purchase mowers now, wear them out, and be prepared then to purchase

other *cheaper* and *better* ones, should be the policy of farmers in Maine."

Another machine known as the "Tedder," or haymaker, has been used in England to lighten the labors of haying, and last year two of them were imported by the Massachusetts Society for the Promotion of Agriculture. It is understood that Messrs. Nourse, Mason & Co. of Boston, propose to manufacture them for sale next season. The principal information I have been able to obtain in regard to their working is contained in two letters published in the Transactions of the Massachusetts Society for last year, (1858,) and which are subjoined:

WALTHAM, Sept. 1, 1858.

MY DEAR SIR:—I have the pleasure to report to you about the working of the Tedding Machine imported by the Trustees of the Massachusetts Society for Promoting Agriculture.

The machine has been used with great advantage, and has given satisfaction to the haymakers. No part of it has broken, or yielded to the hard work done by it. It has been applied to the swaths laid by the mowing machine when they were dry enough to be turned and in the direction of the mower. If grass is cut by the scythe it works best by being driven across the swaths.

The machine has two motions, communicated by gears in the hubs of the wheels—one forward, which lifts the grass and throws it above, over, and behind the machine. The other motion is a reverse one, lifting the grass and throwing it behind. Both motions lift, open and spread the grass, more perfectly than can be done by a man and fork, and the machine does its work as fast as a horse carries it forward. It is heavy, does much work very quickly, and requires one good horse to draw it. I have been away from my farm much of the time of haymaking, but I may safely say that the men who have used it commend it highly as a labor-saving machine, doing its work without any delay.

The machine weighs 1090 pounds. Wheels, axle and framework, are iron.

Very respectfully, your obed't serv't,

GEORGE W. LYMAN.

To R. S. Fay, Esq., *Secretary of the Trustees of the Massachusetts Society for Promoting Agriculture.*

SALEM, Aug. 21, 1858.

MY DEAR SIR:—I desire to express to you the satisfaction I have derived from the use of the Tedder imported by you for the Massachusetts Society for Promoting Agriculture. It was sent to me by Mr. Motley, after he had used it, and I only regret that I could not obtain it sooner. The difficulties we have all met with in making hay during the uncertain weather of this season, have given us peculiar opportunities for testing the value of any machine intended to facilitate the process of drying. And I was surprised to find with how much greater ease I could overcome these difficulties after I obtained the Tedder than before. With diligent use of the machine, I found one good drying day sufficient. Hay, which under the ordinary treatment would have been raked and cocked as unfit to go to the barn until the next day, was thoroughly made by applying the Tedder twice in the afternoon. And every farmer knows the value of this in a season when every "next day" was almost sure to rain.

The machine works with great rapidity and ease in almost all places. I tried it on rough land and smooth with equal success. I used it on hay lying in swath and in windrow opened by the fork, and it worked equally well in both instances. I found that it would thoroughly spread an acre of grass in fifteen minutes, without extra exertion—and the work when done was really done as no man with a fork could have done it, in any length of time. Not a particle of the grass had escaped exposure to the sun and air.

The construction of the machine is simple, strong, and entirely appropriate to the work. I found it better in heavy grass to use two horses, tandem, as the weight was rather more than I liked to put upon one—although this was choice, and not necessity. It required no repairs during my use of it.

I can safely say, that I have found no labor-saving machine more perfect. It enables us to make our hay easily, rapidly, and thoroughly, and makes us entirely independent of that kind of manual labor which requires constant watching, especially in the process of spreading and turning hay, and which is all that can be obtained in these modern days. It seems to me almost indispensable on large farms. After I obtained it, I set apart a field of about five acres for experiment in machinery. It was cut with the simple and admirable grass-cutter, Danforth's patent, sent to me by Mr. Thompson of Greenfield,—it was spread with the Tedder,—it was raked with the horse-rake in common use—and was ready for the

barn, without having had any manual labor applied to it, except to open the windrows, the morning after it was cut. I can only say that no five acres of my grass this season have been made into hay with half the economy and expedition that I was able to apply to these, by means of machinery.

I would express my obligations to you for bringing the machine into my notice, and I really trust our farmers will, ere long, be enabled to obtain them at reasonable prices, and of American manufacture.

Truly, your friend and serv't,

GEO. B. LORING.

R. S. Fay, Esq., *Secretary.*

The horse pitchfork is an implement which might be introduced to advantage upon many of our large hay farms. Pitching hay by hand labor is very fatiguing work, but by the use of this, brute force may be substituted; and as the effective force of a horse is estimated to be equal to that of five men, it should take only a fifth as long to pitch a load of hay by this mode as in the usual manner; and such is said to be the result of actual trial.

Several forks have been introduced for pitching by horse power, of which one recently constructed by C. E. Gladding of Troy, Pa., has some decided advantages over previous ones. It has a hinge-joint at the connexion of the head with the handle, so that by pulling a rope the fork is dropped and the load deposited instantaneously as it is swung to the most favorable spot. It may thus be used under circumstances where the horse fork without the hinge, would be of no use, as under a low roof, beyond purlin beams, or when the mow is nearly filled; nor is there the danger or inconvenience which might arise from the upward sweep and falling back of the handle of a fork without such joint. It is understood that Mr. Gladding proposes to furnish this fork with the necessary ropes, pulleys, &c., for twelve dollars.

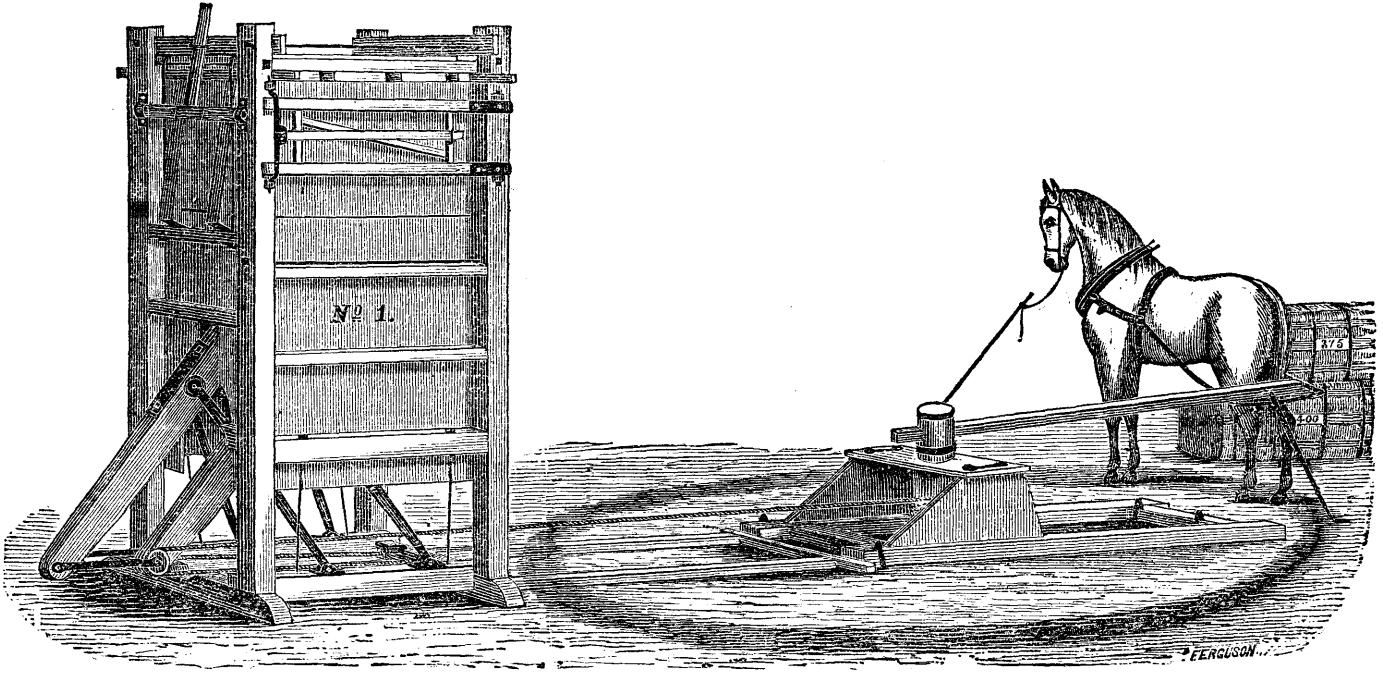
Caps made of cotton cloth for the purpose of protecting hay while in cock from dews, showers and storms, are an introduction into farm practice of comparatively recent date, yet have they so commended themselves by good works as to have come into general and almost universal favor. A few yet oppose their use, but rarely, if ever, is a farmer found to depreciate their usefulness and economy who has once fairly tried them. In the replies received to the ques-

tion of my circular on this point, no doubt is expressed by any one of their value; but some who have not used them express their intention to do so. Of those who have used them, a single reply will serve as a sample of the evidence received: "We use hay caps and find the advantage from them to be great. For instance: last season we cocked up a lot of hay on Saturday afternoon and capped it. Sunday forenoon it began to rain, and it continued wet and lowery for five days. On the return of fair weather we found the capped hay bright. Other cocks in the vicinity uncapped were soaked through and blackened, so that it was not worth half price. Good hay was worth here last spring eighty cents per hundred. If an expenditure of twenty-five cents for a cap saved forty cents worth of hay in that one storm, it must be apparent to the most obtuse that it *paid well.*"

They are usually made of a square of cloth a yard and a half wide, with an eyelet hole in each corner in which a string is tied and fastened by wooden pins.

It is no part of my intent to recommend the present sale of hay from the farms of Maine, believing as I do, that as a general and almost universal rule, it is needful for some time to come, that the crops of our farms be consumed at home in order to bring up the productive power of our lands to a point where we may sell hay or grain, or both, and yet obtain maximum crops.

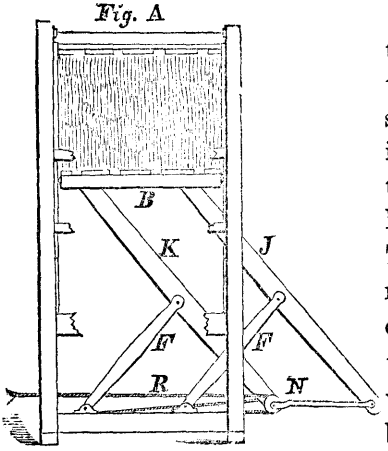
Wherever this is attained, and it is believed that no obstacle exists which need prevent its attainment upon a great majority of the farms of the State, or where the facilities for obtaining fertilizers from other than home resources are such as to admit of its sale *without detriment*, hay may be sold, if a remunerating price is offered, as well as potatoes or any other farm product. In the hope that rapid progress may be made towards an exportation which may not impoverish our lands and thus cripple our productive power, and, as for some markets, and particularly for shipment from the ports on our extended seaboard, it is needful to put it in more portable form than as it lies in the mow, or is pitched from it, I give below an engraving of a hay press exhibited at the last exhibition of the State Society at Augusta, and which has been received with great favor, having proved expeditious and efficient in accomplishing its work, and has received numerous premiums.



VERTICAL PARALLEL LEVER HAY PRESS,

Patented and manufactured by LEVI DEDERICK, *Albany, N. Y.*

Fig. A



The plan of this hay press and the arrangement and operation of the parts will be readily understood by the annexed engraving, in which B is the follower, J K the main levers, F F the fulcrum levers, and N the connection rods. The power being applied at the rope R the levers and each end of the follower must move simultaneously, a mechanical perfection which the patentee avers cannot be attained by any other arrangement; and which is deemed necessary in order to obviate the friction and consequent loss of power experienced in other presses.

Mr. Dederick's prices are as follows:

		Bales from	Height of Press.	
No. 1,	(Stationary,)	375 to 425 lbs.	14 ft.	$165 00
" 2,	(Portable,)	275 to 325 "	12 ft.	$150 00
" 3,	(Hand Press,)	200 to 250 "	9 ft.	$110 00

In my report for 1857, some pages were devoted to the preparation of lands for grass, methods of seeding, and to top-dressing and other means of increasing the hay crop. Numerous statements were also given from practical cultivators showing their modes of operation and success; so that it is not deemed so necessary now to treat these points at length as it otherwise might be. Since then, increased observation and experience have but impressed me more strongly with the importance and economical value of top-dressing. If, as often is the case, barn-yard manure can with difficulty be spared from hoed crops, or purchased for the purpose, it is recommended that muck, sand, clay, ashes, seaweed, or whatever can be procured, be applied, having a care to adapt the dressing to the character of the meadow, (as putting sand upon clay, clay upon sand, &c.) The best results have been by no means confined to the application of barn-yard manure alone. Composts made by carting muck, loam, sods, road and ditch scrapings, and the like, into the barn-yard, yarding the cattle upon it, and afterwards mixing thoroughly once or twice and applied in autumn at the rate of five to eight cords per acre, have produced a surprising degree of benefit.

Applications of stable manure to light soils have frequently proved of less benefit than composts containing clay, loam and vegetable matter. When stable manure is applied alone, it should be in autumn, and upon heavy loams. Unfermented stable manure directly from the barn-yard, applied in spring, is often unsatisfactory in its effects, besides which, it is apt to be left in lumps, which become dry and are liable to be raked up with the next crop of hay.

In every instance which has come to my knowledge where top-dressing has been judiciously and fairly tried, satisfactory results have followed, and I cannot but urge its more general adoption in practice.

Perhaps upon no subject connected with grass culture have we more to learn, or in connection with which there seems room for greater improvement, than with regard to the mixtures of seed to be sown. The almost universal practice is to sow only timothy, red-top and clover, and while it is readily admitted that these are the best if we are to be confined to three, it is equally certain that a judicious mixture of more kinds would result in greater productiveness. We may profit by the teachings of nature in respect of this. Let the turf of a rich old pasture be carefully examined, and we almost invariably find a far greater number of species than in lands recently laid down to grass. When we reflect that each species has its own peculiar requirements and abstracts its constituents from the soil in different proportions from any other, and some perhaps requiring what is not wanted at all by others, we can easily understand how with a larger number we may obtain a larger product, and this too with no greater practical exhaustion of the soil.

And another advantage accrues which is worth bearing in mind, namely, the greater variety of food thus furnished. All feeding experiments show that animals thrive better on a given amount of nutritive matter furnished in a variety of foods, than if given in a single form, as in hay, roots or grain alone; and for the same reason, hay of equal quality in other respects, is better if made from mixed grasses.

Again, mixtures should undoubtedly vary according to the purpose in view, whether for mowing, for pasturage, for soiling, or for an alternate crop. If for mowing, we should aim to have as thick a bottom as possible, and the grasses of various hights, and in this way each may be well developed, according to its kind, and the ag-

gregate crop be materially greater than if only one or two species be employed. For permanent pasture we would desire the most durable and nutritive grasses, affording food both early and late, and capable of resisting drought and bearing the closest cropping without injury. For soiling we might even employ annuals, like Millet, (Hungarian grass,) or Indian corn, which would be utterly unfit for pasture. For alternate husbandry, we would have an eye to amelioration of soil and the amount of vegetable matter to be furnished by and by in the decay of the roots.

Again, mixtures should vary according to the character of the soil upon which they are to be sown. We know perfectly well that some do better on heavy soils and some on light, some on moist and some on dry. There may be special cases where one would be as good, or better, than two, or ten, and there are many cases where five or ten would be better than one or two. All the above and a great many other considerations should be taken into account in deciding on the mixture to be used in any given case. It would be the hight of presumption to attempt to give directions for mixtures best adapted to the different purposes and soils of the Maine farmer, for the simple reason that the knowledge is not yet acquired, nor can it be learned except by numerous, careful and protracted experiments, and these have not been made. They should be made, and the results published for the benefit of others. It is only by experiment that progress in any branch of practical agriculture can be accomplished. Von Thaer very justly remarks: "*Experiments, it is true, are not easy; still they are in the power of every thinking husbandman. He who accomplishes but one, of however limited application, and takes care to report it faithfully, advances the science, and consequently the practice of agriculture, and acquires thereby a right to the gratitude of his fellows and of those who come after.*"

A far greater degree of attention has been bestowed upon this subject in England than in this country; and although what would be good practice there, might be unfit here, we may yet obtain from it some useful hints, and I accordingly subjoin a few of the numerous mixtures which are recommended in foreign works, selecting such as seem nearest to our needs. They are intended to be sown with a grain crop:

For alternate Husbandry.

	For one year's hay.	Hay one year and pasture one year.	Hay one year, pasture two years.
	lbs.	lbs.	lbs.
Italian Grass,	9	9	9
Perennial Rye Grass,	18	18	18
Orchard Grass,	–	2	2
Timothy,	1	2	2
Yellow Clover,	–	1	1
Alsike Clover,	1	2	2
Red Clover,	8	4	2
Perennial Clover,	–	2	4
White Clover,	2	4	4

For our use, this would doubtless be greatly improved by substituting at least a peck (say eleven pounds) of Timothy at the expense of the rye grasses; and a similar change could advantageously be made with nearly all of them.

For Permanent Pasture.

	lbs.		lbs.
Italian Rye Grass,	6	Red Top,	3
Perennial Rye Grass,	8	June Grass,	4
Timothy,	3	Rough Meadow Grass,	2
Orchard Grass,	6	Alsike Clover,	2
Meadow Foxtail,	2	Perennial Clover,	2
Hard Fescue,	2	White Clover,	3
Meadow Fescue,	2		
Tall Fescue,	2		47 lbs.

For Hay and Pasture in shady places, Orchards, &c.

	lbs.		lbs.
Orchard Grass,	6	Red Top,	2
Italian Rye Grass,	6	June Grass,	3
Perennial Rye Grass,	6	Lotus Major,*	2
Sweet Vernal Grass,	1	Perennial Clover,	3
Hard Fescue,	2	White Clover,	4
Tall Fescue,	2		
Timothy,	3		40 lbs.

* This plant, of which I know scarce any thing, beyond its botanical name, was once

For dry sandy or gravelly soils.

Red Top,	3 lbs.	Italian Rye Grass,	4 lbs.
Tall Oat Grass,	3	Perennial Rye Grass,	6
Red Fescue Grass,	4	Yellow Clover,	4
June Grass,	4	White Clover,	4
Meadow Soft Grass,	3		—
Timothy,	3		38 lbs.

For reclaimed bogs of peaty or mucky soil.

Tall Oat Grass,	2 lbs.	Perennial Rye Grass,	5 lbs.
Orchard Grass,	3	Italian Rye Grass,	10
Rough Stalked Meadow Grass,	3	Yellow Clover,	2
		Perennial Clover,	2
Meadow Foxtail,	2	White Clover,	3
Hard Fescue,	6		—
Timothy,	5		43 lbs.

Upon peaty soils with us, Timothy usually succeeds remarkably well, and should form a large proportion of the seed.

The above examples are sufficient to convey an idea of the necessity which exists in the opinion of those most conversant with the subject, of employing a greater number of species of grass in seeding down than is customary among us. It is in fact deemed indispensable to the best success.

My report for 1857 embraced statements from a number of practical farmers as to the amount of seed required per acre. In this connexion it is believed that the following table compiled from Lawson's *Treatise on the Grasses*, and a prize essay of J. D. Sterling's, will be found of value:

Column 1.—Contains name of the grass.

" 2.—The average weight of the seeds per bushel, in pounds.

" 3.—The average number of seeds in one ounce.

" 4.—Shows in inches, the depth of cover, at which the greatest number of seeds germinated.

" 5.—Shows, in inches, the depth of cover at which only about half the number shot into growth.

" 6.—Shows, in inches, the least depth of cover at which none of the seeds shot into growth.

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mentioned to me by a foreigner of great attainments in agriculture, as an exceedingly nutritive one, and probably well adapted for cultivation upon our clayey loams. I have not known of its being tried in this country.

1	2	3	4	5	6
Meadow Foxtail, . . .	5	76,000	0 to $\frac{1}{2}$	1 to $1\frac{1}{4}$	$2\frac{1}{4}$
Sweet Scented Vernal Grass,	6	71,000	0 to $\frac{1}{2}$	1 to $1\frac{1}{4}$	2
Tall Oat Grass, . . .	7	21,000	$\frac{1}{2}$ to $\frac{3}{4}$	$1\frac{1}{2}$ to $1\frac{3}{4}$	4
Orchard Grass, . . .	12	40,000	0 to $\frac{1}{4}$	$\frac{3}{4}$ to 1	$2\frac{1}{4}$
Hard Fescue, . . .	10	39,000	0 to $\frac{1}{4}$	$\frac{3}{4}$ to 1	$2\frac{1}{4}$
Perennial Rye Grass, . .	18 to30	15,000	$\frac{1}{4}$ to $\frac{1}{2}$	$1\frac{1}{2}$ to $1\frac{3}{4}$	$3\frac{1}{2}$
Italian Rye Grass, . . .	15	27,000	0 to $\frac{1}{4}$	1 to $1\frac{1}{4}$	$3\frac{1}{4}$
Timothy, ...	44	74,000	0 to $\frac{1}{4}$	$\frac{3}{4}$ to 1	2
June Grass—(Poa Pratensis,)	13	243,000	–	–	–
Rough Stalked Meadow Grass,	15	217,000	0 to $\frac{1}{4}$	$\frac{1}{2}$ to $\frac{3}{4}$	$1\frac{1}{2}$
ARTIFICIAL GRASSES.					
Red Clover, ...	64	16,000	0 to $\frac{1}{2}$	$1\frac{1}{4}$ to $1\frac{1}{2}$	2
Perennial Clover, . . .	64	16,000	0 to $\frac{1}{2}$	$1\frac{1}{4}$ to $1\frac{1}{2}$	2
White Clover, . . .	65	32,000	0 to $\frac{1}{4}$	$\frac{1}{2}$ to $\frac{3}{4}$	$1\frac{1}{2}$
Alsike Clover, . . .	63	45,000	0 to $\frac{1}{4}$	$\frac{1}{2}$ to $\frac{3}{4}$	$1\frac{1}{4}$

The results in the last three columns were obtained by sowing the seed in finely sifted dark loam, which was kept moist throughout the process of germination, to which is attributable the circumstance of so many of the sorts vegetating best, as shown in column fourth, without covering, and under full exposure to the light. The combination of such favorable circumstances of soil and moisture can, however, be rarely or never calculated upon in field sowing. It would therefore seem the policy of the farmer to cover seeds, but as slightly as possible. The table is suggestive and instructive as to the quantity of seed to be sown, as well as regarding the proper depth of covering, for a little calculation will show that the amount commonly sown where a mixture of Timothy, redtop and clover is used, would suffice to give from one thousand to two thousand seeds to the square foot. Now as a sod can rarely be found containing a half or a quarter of that number of plants, it would seem that much seed fails, either from bad quality, too deep covering, or some other cause, and should suggest caution as to all the points on which success or failure may depend.

The practice of fall feeding, or pasturing meadow lands, is generally practiced by our farmers, and almost as generally condemned as injurious. The inquiry is an interesting one, whether the opinion, or the practice, is more correct, and an inquiry into their merits would likely show that much depends upon the manner and extent in which it is done. Upon mowing fields in good condition, (and

there ought to be none others,) there is usually a tolerable second growth which may in many cases be used as pasturage to quite as good advantage as to cut and store, or if not sufficient for a crop to be harvested, to be left unfed with the view to enriching the land by its decay or to protecting the roots during winter. The manure left by the feeding animals will increase the future product more than would the decay of the grass, and as for protection, if not fed too close, our usual winter's snow is quite sufficient. Turning in cattle upon poor meadows, or those yielding less than a ton per acre, and this as soon as the crop is removed, cannot fail to be injurious.

As indicating the opinions of some practical farmers, I append the following replies to a question on this topic:

From Hiram Russ, Farmington.

"Feeding mowing lands in the fall, I consider the greatest injury imaginable, in this cold climate. It leaves the ground bare, and cold winters kill the roots."

From Samuel Butman, Plymouth.

"I feed off the after growth of my mowing lands partially, where there is much of it, in preference to cutting a second crop. Am not in favor of cutting a second crop, except on locations particularly adapted to the growth of grass. I consider close feeding on grass lands generally, as destructive to subsequent crops."

From Joseph Frost, Elliot.

"We do not consider it any injury to put cattle to eat off the after growth of grass, if put on at the middle of October, and not fed too close. Consider it very injurious to put cattle on as soon as the hay crop is taken off."

From George H. Andrews, Monmouth.

"When there is a burden of second crop, it will do to feed it off partially, but nothing is more injurious than to feed off in the fall, what may have sprung up after haying. Our best farmers are well satisfied on this point and are abandoning the practice."

From E. R. French, Chesterville.

"With regard to feeding meadows in the fall, I am not fully settled in my own opinion. It has always been our practice to feed

moderately after the late frosts commence, and am not aware that the practice has been detrimental to the hay crop. While I believe that too early and too close feeding is highly injurious, I think moderate feeding after autumn frosts may be profitable, as it causes the grass to thicken up at the roots, and secures a better under growth the following season."

From Caleb Hodsdon, Standish.

"The feeding of mowing fields in the fall, I think one of the great errors that farmers fall into. In 1853, I purchased a field of twelve acres, that had been feed snug in the fall, for twenty years, and as it was three-fourths of a mile from home, I concluded to fence it up and not feed it, and there has been a steady increase of hay, and I now cut double that I did six years ago, when I made the purchase. I think if farmers would have less field and feed less in the fall, and consequently more pasture, they would find it to their advantage. Ten years ago I turned half my field into pasture, and I cut more hay now than I did before."

Few, if any, of the States of the Union are better adapted by nature to grazing than Maine, yet no portion of her lands are more neglected than her pastures.

Necessity compels us to cultivate winter stores of forage in order to preserve the lives, and in a good degree the condition, of our animals; good policy would dictate, that after being preserved with such pains, they should when turned to pasture find feed in amount and nutrition amply sufficient to insure a *full* flow of milk, or a *rapid* increase in growth or weight. If we reckon the money value of the milk, meat and wool obtained from pasturage, we find it very far exceed that obtained from the consumption of all the hay, roots and grains which have been cultivated and harvested for their use at great cost, while the care and expense bestowed upon those pastures to render them fertile bears a small proportion to that given to the harvested crops. This, it is true, would still be the case under an improved husbandry; but that the disproportion at present existing between them is quite too great, and that true policy dictates that far more attention should be given to pastures, is a proposition so palpably true that no intelligent farmer would for a moment think of disputing it. In fact, our pastures to a considerable extent consist of lands formerly in meadow, and which have been cropped for

hay with no returns of fertilizing materials being made, until the product would little more than pay for gathering it, and have been turned out to pasture with a view to improvement under a neglect more wholesome than their previous treatment.

So general is the neglect of pastures in this State, that if my own observation be not at fault, where one acre can be found, upon which labor and expense have been bestowed for the express purpose of improving its condition as pasture ground, there are several which have been so hardly treated that they are confidently expected to improve simply by being thus used.

This naturally brings us to the consideration of the fact, of which it is difficult to say whether it is better known and more universally acknowledged in theory, or more ignored and neglected in practice, viz: that farmers generally strive to occupy too much land. An enlightened policy would dictate the reduction of what is subjected to the plow to the amount which can be properly manured and cultivated—to bring up so much of the pasturage as is not under the plow to a fair degree of productiveness, and so much as cannot thus be improved, be used to grow a good crop of wood or timber, instead of a worthless crop of bushes, brakes and weeds.

Wherever a rotation of crops can be adopted, let this be done, and let it include a definite term of pasturage. To such extent, if the rotation be judiciously carried out will good pasturage be secured. For the rest, let the means used be adapted to the nature of the case. In many instances where a rotation may not be practicable, the land may be plowed, harrowed and re-seeded.* This alone will often pay a large profit, and larger still, if at the same time an application of compost or leached ashes be made. If this cannot be done, as with a great deal of land in Maine, where from too steep

* I am aware that an opinion prevails among many farmers that the sward obtained by re-seeding plowed pasture, is greatly deficient, both in permanency and in the sweetness of its yield. That such has often proved to be the case, is readily admitted; and that such will continue to be the case so long as the seeding is confined to Red Clover and Timothy, we ought confidently to expect; as the former is only a biennial, and the latter (of first excellence though it be as a *meadow* grass) is *unreliable* as a *pasture* grass. We have yet to learn of the first instance where a sufficient re-seeding with the grasses which chiefly prevail in our best pastures has failed to give, within a proper length of time, a sward fully as permanent and yielding quite as abundant and sweet feed as any old one whatever.

elevation, or from the existence of ledges or large boulders, it is out of the question to plow to advantage and which is yet capable of yielding early, nutritive and sweet feed, we can adopt other means. If they be overgrown with running junipers, bushes or weeds, let them be cut clean, and after drying a few days, be burned, together with any decaying logs or stumps, and the ashes spread around. It is said that such cutting is most effective in the month of August, and the burning is of course best done on a pleasant and not very windy day. A liberal supply of seeds, consisting of white and red clover, and of redtop and other pasture grasses, should then be scratched in with a stout iron toothed rake, or a light, sharp harrow, bestowing a double dose of ashes (or manure) and seeds upon any bare knolls. It will be found of decided advantage not to admit cattle until at least the next season and somewhat late in the season, as the pasture grasses generally do not arrive early at such degree of maturity as to bear cropping without injury. Redtop in particular rarely amounts to much before the second and third years, and all are much better for getting a good growth before being fed down for the first time. If the bushes start again, it is needful that they be cut repeatedly until they die out; but for most bushes, rarely will more than a second cutting be requisite. Sweet fern and brakes are the most obstinate, but several cuttings the same season usually destroy even these. Canada thistles are a great pest, and whether in pastures or by roadsides, every farmer should contribute his share towards their eradication. They should be mown when coming into bloom—certainly before any seeds ripen, and repeatedly afterwards the same season. It is averred by some farmers that when mown just before a rain they rarely start again. However this may be, sure it is, that they can be eradicated by repeatedly cutting them during one or two seasons, beginning when they are in the height of their growth and vigor and following at intervals of a fortnight subsequently.

A few hours labor occasionally, may be spent to advantage on pasture grounds, in spreading the droppings of cattle and horses. If these be left as dropped, some plants are killed out, and those adjacent shoot into a rank, coarse growth, which is so unpalatable that cattle will not touch it until very hungry indeed; but when spread, an increased growth of sweet and palatable feed results.

Top dressing may be resorted to upon pasture lands, with equal benefit as upon meadow lands, and the same rules apply in regard to the fertilizers to be spread—gypsum, marl, ashes, leached or unleached, bone dust, pond, river, peat, salt marsh, or dock mud, marine manures generally, where these may be obtained, and even road scrapings, may all be used to very decided advantage, and often produce an improvement even more immediate, marked and durable than stable manure. Upon lands long cropped by milch cows and young stock, and which have thus yielded a large proportion of their phosphates to the milk, and bone carried from them, probably no application is equal to crushed bones, and it is sometimes necessary to resort to this dressing upon old pastures, not merely to produce increased fertility, but to obviate the effects of what is called *bone disease* in cows, and which is caused by a deficient supply of phosphates in their food. Whenever a cow is found eagerly nibbling or chewing a stray bone, as is not unfrequently the case, we may be sure she is suffering from a deficiency of the bone producing material in the food, and the remedy is obvious. If crushed bone cannot be obtained, leached ashes will serve this purpose, as they usually contain enough phosphate of lime alone to repay the cost. Liebig states that leached ashes from the wood of the common beech tree, yield about five times as much phosphate as is contained in rich animal manure.

Another point with regard to pastures should not be forgotten. It is impossible to secure a good growth of valuable nutritious grasses upon land which is encumbered with stagnant water either upon or near the surface. Under-draining is as useful upon pasture ground as upon meadow land, and if carried out would contribute greatly to the health of cattle, and particularly so in the case of sheep. Open drains, however, if suitably cared for and kept open, serve a valuable purpose; but unless drainage in some form be secured, wet, marshy, swampy lands, however well prepared in other respects, will soon become occupied with rushes, flags or water grasses, to the exclusion of nutritious feed, and to the detriment of the stock feeding upon them, besides being badly poached up by the tread of the cattle. Division of pastures, so that the stock may be removed from one portion to another, is in many instances, attended with advantages outweighing the drawback of increased cost for

fencing. Upon this point, Thaer* very justly remarks—"the division of pasture land into separate portions, whether these portions are close together or situated at considerable distances from each other, and the practice of successively turning the different kinds of cattle on to these divisions and then leaving the herbage to recover itself, is a system which possesses decided advantages over the practice of suffering the cattle to wander over the whole extent of the pasture ground. Cattle which are always confined in small spaces, do not spoil so great a portion of the herbage with their feet, as if they had more space to graze over. The grass is consequently uniformly eaten off from the whole of the ground and then left to recover itself. But when the cattle are allowed to roam over a large extent of pasturage, some parts remain untouched, and then the grass grows old and hard, while from others the herbage is cropped so close that it can scarcely shoot up again. Cattle are more quiet in confined pastures, and quietness is highly advantageous to them.

In using pasture ground, it is moreover necessary not to crowd it with a greater number of cattle than it can properly and advantageously support. When too great a number of cattle are turned upon the pasture, vegetation is checked; the plants have not time to attain their full growth; the cattle bite off the tops of them and then tear them up by the roots. On the other hand, it is equally injurious to a pasture for too small a number of cattle to be turned on it to graze. The effect of this is not only to diminish the utility of the pasture and the return that it yields, but tends to impoverish it. Under such circumstances the herbage shoots up in great luxuriance, and many plants appear, which the cattle will not eat after they have attained any hight. These plants become strong and multiply, while the finer kinds of herbage, those best adapted for pasturage, disappear."

The plan of stocking partially exhausted lands with sheep, with a view to assist in their renovation, was alluded to in an article on that subject in my report for 1857, and I venture now to repeat a single paragraph in connection with the present remarks upon pastures. The peculiar advantages which they afford for this purpose are thus stated: The sheep of all domestic animals is the least dainty

* Principles of Agriculture.

in its tastes and the easiest fed, eating freely it is said of a hundred different species of plants which are refused by the horse and the ox. They are thus of great utility in cleansing foul lands by the extirpation of troublesome bushes and briars and noxious weeds. Nothing comes amiss to sheep; they feed upon all such with avidity and fairly destroy them. Their digestion of what they eat is so complete and thorough that no weed seeds after passing this ordeal retain any germinating power. Besides this, it is the animal which derives the greatest benefit from the food which it consumes and at the same time gives the most active and enriching manure to fertilize the land, and this when at pasture, it scatters not only copiously, but with remarkable evenness, over the land, thus aiding the introduction of choice and delicate grasses, while horses and neat cattle on the contrary, drop their excrements in large deposits, which tend to the destruction of the more delicate sorts of feed and the growth of such as is rank and coarse."

In Massachusetts much attention has been given to this method of improving pastures. I saw it recently stated that in Lynn some land was bought and enclosed about eight years ago, "a hundred acres of which would not afford a cow a living." Only as many sheep were first pastured upon it as it could carry, and the number increased by degrees so that the third year three hundred sheep were well kept upon two hundred acres. Mr. Sanford Howard who visited it then said it presented a striking contrast to its previous appearance. "On the parts most closely fed, the wild roses, whortleberries and blackberry bushes and wood wax were almost entirely killed, and there was a very good sward of blue grass, redtop and white clover." The editor of the New England Farmer writing lately from Hingham, says: "Some of the finest examples are afforded here of the effects of feeding sheep upon pastures that have become exhausted of nutritious grasses and grown up to briars, bushes, brakes and moss. I have seen pastures to-day that had become almost worthless, but now green and smiling as a lawn, with every inch among the rocks covered with the richest pasture grasses, and not a blackberry vine, wild rose bush, mullen or other worthless plant in sight. The sward does not seem compact and sound, but loose and porous, and filled with the most healthy and vigorous roots. The sheep grazing upon these pastures afford ample evidence of the

richness and luxuriance of the grasses upon which they feed. These examples, with similar ones that I have met in other places widely remote, would seem to shed light upon the perplexing question so often asked, 'How shall I reclaim my old pasture?' All over New England there are thousands of acres producing little or nothing, that might be renovated by the introduction of sheep upon them, while the profits from the sheep themselves I believe would be larger than from the same amount of money invested in cows. I have been told of an instance where a hundred acre pasture fed scantily only twelve sheep and six cows the first year, but on the second summer fed well twenty sheep and twelve cows, and continued to increase in fertility until more than double this number were well fed upon it."

Appended, are extracts from the statements of cultivators in various parts of the State, giving their opinions on grass culture and hay harvesting, in reply to a circular of inquiry sent out last spring. To have inserted all which has been received, would involve much of repetition and make the report more voluminous than is deemed desirable. Care has been taken to report all opinions at variance with the methods of practice advocated in the preceeding pages.

By E. B. Randall, Limington.

"Spring, and as early as the land can be worked to advantage, is the best time for seeding down with grass; then the grass has time to get well rooted before dry hot weather, which frequently kills late sowed. Spring sowing is more likely to live through the winter than fall sowing. Clover sowed in the fall is almost certain to winter kill. When land is well worked in the spring it is light, and grass roots will grow with grain roots soon enough to hold it from falling.

I think it best to sow with grain, and choose barley or wheat. By sowing grass seed with grain, they form a sward in a few days, sufficient to keep the land from falling heavy, which is a great benefit to grass in after years, and by sowing grain and grass together we get a crop of grain (or straw) the first year, and grass has the benefit of the straw stubble and the lightness which it has maintained during its growth.

My mode of curing herdsgrass or fine hay, is to mow it in the forenoon and spread it when the dew is off, and rake and cock it in the afternoon, if it gets dry enough; but if not, we turn it up, if

the weather is good; the next day succeeding, the cocks are opened and turned up and stored, when it is as dry as can be handled without crumbling, (a stage that requires particular attention,) for more drying than that is injurious.

We let our clover lay in swath until the upper side is wilted, then turn it over; next day cock it up with forks and hand rakes, and let it stand over night; then re-cock it once a day until dry enough, never spreading the cocks after once made. Clover cut in full bloom and cured without the bloom fading, will retain its leaf and be worth as much per ton as other hay, but it takes a larger pile for a ton than it does of fine hay.

I prefer to cut clover in bloom, and other grass before the seed is full, when it contains the most nutriment; it cuts easier then than it does after that period, which is a saving of labor, and all grasses that I am acquainted with, as their seeds ripen, their leaves ripen also, and fall or wither away.

Early cutting with good curing, secures good hay well filled with sugar, starch, gum and oil, just what is required to make flesh, fat, &c.; but late cut hay only contains woody fibrous substance, with a little seed, the rest being shaken out before the cattle get it. Early cutting gives the roots a chance to sprout up and send forth a second crop before they are exhausted; but late cutting serves to kill the roots, by taking all the sap from them and leaving them in their weakest state and their stalks open to hold water to kill or sicken all below.

Great loss is sustained by late cutting. Most farmers *begin to cut about one week too late.* I reckon labor worth one-third more in early haying than in late. Herdsgrass is more apt to rust than it used to be, and the old rule of letting it ripen its seed, endangers it for hay.

I have used top dressing some, in order to test the worth of it, or in other words, to know if it would do any good, for many of the farmers here said it would not; but it will do good and may be made and applied to *pay well.* If manure cannot be made and applied to the land so as to pay something I am a ruined man."

By Harry Hammond, Sanford.

"It is best to seed down grass land in the spring, because the roots get larger and will stand the winter better. Again, you can sow clover with safety, and have better hay by its being mixed

(clover, timothy and redtop.) When it is seeded in fall, nothing but timothy is usually sown.

It is better to sow grass seed with grain. It should be sown after the grain is harrowed in, and then be covered by brushing, as harrowing covers too deep; the grain being of more vigorous growth, protects the grass seeds from the scorching rays of the sun till the grain is taken off, which give seeds all a chance to germinate and become rooted. Wheat give us the best stubble.

I cultivate timothy and clover only. Redtop comes in naturally in sufficient quantities. I cut in the morning, open the swaths soon as the dew is off, let it lie till towards night, then am sure to put in cock before it is dampened any by the dews; next morning, when the ground has become dry and warm I spread it, and about eleven o'clock turn it over, and have it put in the barn by four o'clock while it is warm by the sun.

Clover I treat nearly the same, not dry it quite so much, and sometimes let it stand in cock the second day and get in the third. I consider clover worth some more for cows and young stock than other hay, but not so much for oxen that work.

I prefer to cut grass soon as the blossom begins to fall or change, as cattle will eat it as readily cut at that stage as any other, and it contains more nutriment, is better for fattening than if cut either earlier or later.

The effect of early cutting is, the hay is not worth so much on account of its not getting to maturity; cattle will eat it with as much avidity as later cut, but it is very apt to give them the scours; and if late cut, cattle will eat it only by compulsion through fear of starving, having lost the qualities which made it palatable; besides which, late cutting is destructive to the roots and permanence of the grasses, while early cut does not injure their permanence as the seed does not come to maturity.

I use no salt or lime in storing my hay except in cases of extreme necessity, I use a little salt, say two or three quarts to the ton.

Do not use a mowing machine, but think it a profitable investment under proper circumstances.

I use the wire spring tooth horse rake; think that the best unless the ground is perfectly smooth, when perhaps some other rake might be preferred, only by its being easier to manage. I can rake as much with my horse and rake as five men can in the same time with small rakes, and do it as well.

Do not use hay caps, but consider them a very useful article."

By Joseph Frost, Elliot.

"I have plowed low meadow land in the fall, laying it in beds two to three rods wide, harrowed thoroughly, and seeded in March, with good results. Also, I have re-seeded land, the stubble or grass being killed out by the drouth, when sowed late in spring; re-seeded the following March, and received a fair crop of clover, the same year. I prefer March when grain is not connected. We have not sowed grass seed without grain on our high land, and always received a good catch of seed when sowed early in spring, or by 15th of May, except in years of severe drouth.

The best mode, in our opinion, of curing herdsgrass and redtop, is to cut it when the seed is fully formed, in the fore part of the day (the weather being favorable) put up at night, re-opened and frequently turned until dry. Clover to be cut and wilted; then put up and stand twenty-four hours; then opened and turned frequently, with a bright sun, until three-fourths made, and then mowed. We do not consider clover hay worth so much as herdsgrass and redtop by twenty-five per cent.

We prefer cutting herdsgrass and redtop when the seeds are about full, and before the grass changes its color. Clover may be cut when the blow is about half changed; better to cut earlier than later. Hay cut at the time above stated is worth twenty per cent. more than hay cut late, from grasses considered equal at the proper time. Early cut grass gives the roots a chance to recover and the frost does not have such effect as on the late cut, and the land will continue to hold out longer than by late cutting.

We consider very close cutting to be injurious to the next crop, unless the soil is wet and in high cultivation. I have not used salt for many years; we used it some years, at about one peck to the ton; do not consider it any advantage to hay, except in wet seasons.

Manny's mower is in use in Elliot, Kittery and Portsmouth, and neighboring towns, and in my acquaintance it has given general satisfaction.

I have been in the use of hay caps some years, made of cotton cloth. I obtained the widest cloth that could be found at the time, used a square with four stones, one* in each corner; they are not

* Stones, one to one and a half pounds, each.

so large as it is necessary, but have done me good service. I should advise to have cloth not less than one and half yards wide, and a square will make a good cap.

We do not consider it any injury to put cattle to eat off the after growth of grass, if put on at the middle of October, and not fed too close. I consider it very injurious to grass land to put cattle on as soon as the hay crop is taken off.

I have not top dressed grass land extensively. What I have, the result was good. Have done nothing in under draining; but have drained our low meadows with satisfactory results. We have done a large amount of ditching on salt marsh, and it has increased our crops of hay one-third, and the hay is of a better quality. Ditches on salt marsh ought to be made three feet deep and width sufficient to get out the mud."

By Caleb Hodgdon, Gorham.

"Unless grass seed can be sown by the first of May it is best in four years out of five to sow in the fall or winter. The best catch I ever had I sowed in the winter on the crust. But for a number of years I have sowed my grass seed alone without any kind of grain, and am satisfied it is the better way; and if farmers would try it I think they would come to the same conclusion. There are many reasons for it; first the grain, no matter what kind, has a tendency to kill the grass. A few years ago I sowed a piece of winter wheat, about one quarter of which was winter killed in spots, and for three years I cut double the hay on those spots that I did in any other part of the piece; and this agrees with my observation since. I sow no other grass seed but herdsgrass and clover—formerly I sowed a mixture of redtop, &c., but it never amounted to much on my land. All the grass I cut in forenoon I spread out and wilt as well as I can, then in the afternoon I rake and bunch up in as small bunches on the ground as I can, but do not care how high the bunches are, and do not meddle with it until the third day unless it be in the latter part of the season when I am sure it will make fit to go in. My clover I never open until the third day. The present year I had two acres of clover, where I had five tons, I cut and wilted as above, and did not open until the third day at ten o'clock, when the ground was dry and warm, and at two that afternoon I commenced hauling in, and never had any made better. One of my neighbors cut a similar piece at the

same time, and opened his the second day and put it up again—his is now musty and mine entirely free from must. I consider my clover (cured in this way) nearly equal to any hay in my barn. I have tried the different kinds of horse rakes and think the revolving rake much the best. I think it saves me one quarter the labor in raking. I am aware that many say hay should not be cut until it is ripe, but my oxen and cows tell me a different story; they thrive and give the most milk on the early cut hay; and I think it spends equally well; and I find those same men that argue for ripe cutting when they come to purchase want my first cut hay. I commence haying the first of July, (this year the last day of June,) and I regretted this year that I did not put on more help the first of the season."

By D. W. Dole, South Windham.

"I prepare my ground, for grass, by planting first year with potatoes, with plaster in the hill; second year to corn, manuring well; the spring following, plow the ground as deep as it was broken up, thus mixing the soil and manure well together, and harrowing until it is mellow. In seeding down, people are apt to think too much of the grain crop, and put on too much seed, thereby preventing the grass seed from growing. In seeding down with grain, one and one-half bushels of oats, or other grain in proportion, is sufficient for *an acre*, to insure a good catch of the grass seed. I have found one peck of herdsgrass and six pounds of clover seed sufficient for an acre. Sowing too large quantities of grass seed has not a good effect. It swards the ground so thick that the herdsgrass and clover die out for want of room. Herdsgrass having a bulbous root, with numerous small fibrous roots that spread from two to six inches, thereby drawing nourishment for the stalk, requires room. Clover, too, has a large tap root that don't like to be crowded, but they grow admirably together, for the clover is short lived, and when it dies makes the herdsgrass heir to all its estate, land, roots and all.

Redtop and fowl meadow grow best on low land, where they cover the ground with a thick sward that kills out other grasses, and therefore should not be sown with herdsgrass or clover. They seem to be natural with us on lowish lands and give good crops of hay for many years in succession, without any cultivation. I prefer to sow the seed after the grain is harrowed in, and then brush it in with a brush harrow which will cover it sufficiently. I think

rolling land is not a good plan as it leaves the top hard and liable to bake, especially clayey soils, and leaves the ground so smooth that we are apt to cut the grain so close that there is nothing to protect the young grass from the sun and drouth. If the ground is a little rough, and you can't mow quite so smooth, you will leave a protection for the roots that will repay you in a few years. In getting hay I like to cut the grass when it has attained its full growth, as it then makes the most weight of hay and gives the most nourishment to animals. Make in the field until it will keep in the mow without heating; hauled in as near the middle of the day as convenient, for at that time there is the least moisture in the air, and I shall be pretty sure of good hay in winter. Some people drive into haying with no other motive than to get done first, and drive blindly on without discretion. Such, have poor, musty hay, for their cattle. "There is a time and a season for every purpose," and it is just as bad to be before as after it.

Mowing machines are used with good success here; all kinds of rakes, from the two legged one, that goes of itself, but is of no use in the field, to the independent tooth rake, are in use, but the revolver is most used; in fact all kinds of improved haying tools are used here."

By E. G. Wagg, Yarmouth.

"Sowing grass seed is best done during the months of April and May, with wheat or barley—wheat is preferable.

Some farmers seed their grass lands in August or September, and sometimes it works well, but is not so sure, as it is liable to be thrown out of the ground during the following winter or spring. Others prepare the ground by plowing and harrowing in the fall, and sow without grain, as soon as the snow leaves it in the spring. This method sometimes works excellently well, but as far as my observation extends the grass does not hold out so long as when sown on a well prepared soil with grain.

The quantity of seed varies with different cultivators; when no redtop is sown, one-half bushel of herdsgrass and four pounds of clover seed is the quantity usually sown on one acre.

The method of curing is to cut in good weather, and spread evenly over the ground; before the dew falls rake and put it into bunches of about one hundred pounds. The next morning if the weather is fair these should be opened; carefully turned over about noon, and if sufficiently dry carted into the barn.

As to the state of dryness, haymakers differ considerably. My rule is this: take up a handful of hay and twist it as hard as I can with both hands, if it breaks off I consider it too dry, if no moisture exudes from it, I think it dry enough to mow down.

Clover should receive different treatment. My method is this: as soon as it is fairly wilted, it is thrown into cocks of fifty or sixty pounds each; the next day, if the weather is fair, it is all carefully cocked over and, the same, each succeeding fair day, until it is dry enough for the barn.

It is best to cut grass when full in the blossom, and from that time till the seed is formed, as we thus secure it when in its greatest perfection.

I think early cut hay is much the best; but grass should not be cut before it blossoms. Not only do we lose in the quality of the hay by cutting late, but its effects are injurious to the permanence of the grass roots.

Farmers that cut their hay too late are great losers. I think early cut hay is worth twenty per cent. more than late cut, if fed without provender. As far as my observation extends, those who delay their haying till late usually obtain small crops, and stock fed on such hay show evidence of its poor quality."

By David Allen, Upper Gloucester.

"I consider the best time to seed timothy and redtop, early in autumn, if the season is not too dry, for the reason that it has the advantage of autumn rains, as also those of the spring, which saves it from being killed by the drouth, if there should be one, early the next season, and the clover seed to be sowed in April, following. I have never sowed grass seed alone in the spring. I prefer seeding to grass in the spring, with wheat or barley, because they will tend to prevent the weeds from growing and overpowering the grass.

I cut my herdsgrass and redtop and spread it to sun until two-thirds day, then cock it and again spread, until so dry that it will not sweat much in the mow. I cut clover and let it remain in the swath one day; towards night it is pitched into small cocks and there stands, until nearly dry, when it is turned over and spread a little if necessary. There is more loss by late than by early cutting. Experience has taught me that two inches above the ground is as close as grass should be cut. If it is cut closer than that, the hot sun has a bad effect on the roots.

I have used salt on my hay for many years, and observation has taught me that four quarts to the ton is as much as the cattle need, for they would not eat more if they had access to it every day while eating a ton of hay.

I have used a horse rake for twenty years; for the last eight years I have used Delano's wheel rake, which I consider superior to all others. One man and a horse will rake more hay in a given time than six men.

I have practiced top-dressing four years; I cart loam or muck into my barn yard when done planting, and yard my cattle on it during the summer and early autumn months, turning and mixing it once or twice with the droppings of the cattle, and that which was made during the winter. I spread about seven cords per acre, in the month of October, with very satisfactory results."

By G. C. Waterman, Brunswick.

"My method of curing clover, is as follows:—If my grass does not lodge, I prefer to cut when in full bloom. When the wet is well dried off, shake out well, leaving it as light as possible. When it is wilted (perhaps two or three o'clock same day) pitch into heaps of about seventy-five pounds, as snug and compact as possible, without rolling or pressing in any manner; rake up scatterings, if any, and complete the whole before the dew begins, as early as five o'clock. Let it remain thus, two or three days. Before carting to the barn, spread out and warm in the sun, three hours; finish getting in as early as five o'clock, to avoid all damp from fog or dew. I cut no hay, upon which cattle will thrive as well, as on clover cured in this manner. Herdsgrass and redtop, rake into winrows and *pitch* into heaps (*never roll up my hay*) with caps, may remain out, through a long storm. Dry it as I do clover, until carting, which is to be done before *five o'clock*, and no drier than is essential to the preservation of the hay. Such are the result of forty-five years experience in hay making."

By Augustus Sprague, Greene.

"I think it better to sow grass seed in spring and with grain, as the grain will shade it when young and weak, and will keep the ground moist. On my land, (a clayey loam,) I have no trouble in getting a good "catch" with any kind of grain.

My mode of curing hay of all kinds is to cut and let it wilt, then rake and put it in cock and let it stand over night, open the next

fair day, and with a little stirring it is fit to go in unless it is very heavy grass, in which case I think it better to let it stand in cocks two nights.

I don't think there is any danger of getting hay in too dry, if kept in cock most of the time and not parched up by being spread in the sun.

I prefer to cut grass when it is in bloom, because, if there is not more nutriment in it, cattle *relish* it better, and I think will grow and thrive better upon it.

I use a horse rake, and think I save fifty per cent. in the work of raking. Have used the spring tooth, but now use Delano's, called by some the wheel rake, and like it better."

By G. H. Andrews, Monmouth.

"Farming is not my business; yet I live in the midst of a farming community, and having more or less to do with that branch of business, I am interested in whatever tends to promote the cause of agriculture. I shall therefore submit for your perusal some of my observations and experience.

The best time for seeding grass land is spring, because becoming more firmly rooted, it is better able to withstand the frosts of winter. Our winters, or rather I might say springs, are very hard upon the grass crops, hence the necessity of being well rooted. Some however, have sown as late as September, and succeeded well; but I would advise none to put it off till fall, but to sow as early as possible in the spring.

I am satisfied when seed could be sown early, it will do better sown alone, but our farmers are not conditioned to do so; therefore, it is usually sown with grain, and with wheat or barley does quite well. We consider wheat or barley decidedly the best of all grains with which to sow grass seed, as they do not cover the ground, so but that the sun and air, which are necessary for the growth of all plants, can reach the young shoots. Farmers cannot take too much pains in this particular, to secure a good *catch* of grass, as it is the most important crop of the farmers of Maine. Few of our farmers have made much money by the raising of grain, but many of them have acquired an independence by the raising of stock.

We grow no other grasses than herdsgrass, redtop and clover, or at least I might say no other seeds are sown. Bog and meadow grasses are grown somewhat with us, but I esteem such hay but

lightly, especially to feed out to stock; it does very well for litter, to throw into our hog and cow yards, but no farmer will feed out much to his stock if he is mindful of their growth. I am aware there are those who differ from me in this matter, but I base my decision upon not only observation, but experience.

The method adopted for curing herdsgrass and redtop, is to cut down in the morning, of a fine day. When dry from dew, spread evenly; stir often where it is thick; put into cock at night; next day open and spread to the air. The hay having sweat a little during the night, will make very rapidly when opened, and with proper care will be in a fine condition for the barn in the afternoon, and will need no salt to save it. Hay never should be burned up in a hot sun, so as to be brittle; it should be cured, not baked. Clover is usually treated differently. Cutting in the morning and lying in the swath until afternoon, it is put into small bunches, where it lies until ready for the barn. When the weather has been good, hay got in this manner is much more valuable. I consider clover hay to be very valuable. It will require more of it, but for young stock and milch cows it is decidedly preferable to all others, in my judgment.

When the seed is full in the milk, or perhaps a little turned, is in my opinion the proper time to cut grass. The stalk has at this period arrived at maturity and contains all the nutritious elements that it ever will.

Early cut grass does not contain the amount of nutriment in grass of a more mature age. In late cut grass the roots retain their vigor and thereby are more tenacious of life, and will not run out (as it is termed) so readily.

More loss is sustained in a succession of years by early cutting for reasons stated above.

If the season be wet it will do to cut close, but if dry, you cannot cut close without injury to the roots. There is nothing lost in leaving sufficient to protect the roots against a scorching sun.

I use neither salt or lime; do not consider it a good practice. Stock, in my estimation, do not do as well upon it as upon fresh hay.

There are but two machines for cutting grass in our town. Those are liked well; they are of one horse power.

Caps are coming into general use; are liked well; they are made of common sheeting, and are square, with pins at each corner to run into the hay for security against wind.

Top-dressing has been practiced as yet, but little, yet it is *the* way of dressing. Our farmers are beginning to adopt this method. Thus far it has been done with manure from the yard or heap, spread on in the spring. As for the quantity I do not know of any definite quantity; it has not become general yet, and therefore no standard has been fixed. They, however, cover the ground pretty well. The effect has been a marked one, and the only reason of its not coming into general use is the want of manure. Most of our farmers have scarcely enough for their cultivated crops; in fact, I might say they have not half enough, for they could put on double and not over-dress.

Although manure is no doubt the best article for top-dressing, yet, sand, loam, gravel or clay even, spread evenly upon our grass land, would pay three times over for all costs. Probably August and September would be as good a time for dressing with sand or loam; the ground is then dry; it would not cut up the fields as in spring. The loam would be dry and finely pulverized; would spread evenly without difficulty. It would also cover up what seeds might have dropped through haying. Also a little seed might be scattered about, under such circumstances, with good advantage."

By Jabez D. Hill, Moscow.

"I have never sown grass seed except in spring; therefore cannot say there is any better season. Have seeded to grass in conjunction with wheat, rye, barley and oats, and am not aware that one kind of grain is preferable to another for this purpose, unless it is sown thinner, so as to afford the young grass a better chance to escape smothering. You ask, what varieties besides herdsgrass, redtop and clover do you cultivate, and what their value compared with the above-named? If by this, you mean the kind of grasses which I *encourage* and *improve* by manuring and loosening the soil, I shall add "witch grass" to the catalogue. Its value for dry forage I consider equal if not superior to either of the others on the list. It is true, I do not sow the seed—as is the case with the others—because it is not necessary; being endowed with the rare faculty of re-seeding itself, or maintaining its existence in suitable soils, in defiance of very rough usage, when it has once been introduced, which was the case on my farm when I purchased it. Had it not been pretty well stocked with witch grass, I do not

hesitate to declare that with my present knowledge of its value, I should labor diligently to promote its introduction. I might dilate to some extent upon the merits of this grass, did I suppose it would be to any good purpose; but knowing the prevailing prejudices against it, I will forbear, content to let the world wag as it pleases.

The way of curing herdsgrass and redtop which I have followed for many years, is to mow in the forenoon and shake out before dinner. Between two and five o'clock, rake and cock, (the interval between dinner and the time we commence raking being spent in carting what hay was cut the previous day.) The cocks are then capped and thus remain till the next day after the dew has evaporated, when we shake out and let it sun till after dinner, when it is carted to the barn. This is the *slow* method, compared with that in which the grass is cut down and allowed to lie unraked till dry enough to put into the barn. As to the "state of dryness in which it is in best condition for the barn," it is impossible to speak absolutely, though a man of experience can readily tell by "handling" when it is right. Hay should be dried no more than enough to prevent its overheating in the mow, and under some circumstances this end is obtained with less drying than in others. If the hay is to be placed on a scaffold, where its depth is slight, it will save in good condition with much less sun-drying than if it is mowed down in a thick mass. I will here mention, that I have at times, in an emergency upon the approach of a storm, got in a load of partially dried hay and placed it upon a scaffold; and that in feeding it out, it emitted a peculiarly sweet, honey-comb fragrance, which I never found in sun-dried hay.

I am not in the habit of sowing clear clover on account of the greater difficulty of curing it, and because I think it lighter, more "chaffy" and occupying a greater amount of barn-room—according to substance—than herdsgrass, redtop or witch grass.

We *prefer* to cut grass when the seed is pretty well formed, but still soft; about the time when in the "second blow"—when the juices of the grass "gum" up the scythe the most,—because the fibre has acquired a degree of firmness but little liable to shrinkage, yet not so far matured as to be tough and woody, and the juices have thickened and attained a consistency which they possess at no other period, and are therefore less liable to evaporate in sun-drying, or to sour in the mow. But with a good deal of hay to cut, we have to *begin* a little before this period, and *end* a

little later. So far as my observation extends, there is more loss from cutting hay too late than too early, owing to the destruction caused by rust, rather than natural ripeness, in some cases; and in others by the early decay of certain forage plants often mixed with grass.

The best hight to cut hay is, to shave as snug to the ground as possible, because we get more; though I think that herdsgrass roots will endure *longer*, if we leave a high stubble.

Have used different horse rakes in former years; like the "independent" the best; but latterly make less use of one where grass is light, because they scratch up considerable "dirt," leave some of the finest particles of hay behind, and considerable time is necessarily consumed in getting the horse from the pasture at a busy season of the day. We now use the hand drag rake on light grass if we are not particularly hurried. If we operated with a mowing machine or a great gang of mowers, we should use the independent horse rake altogether.

You ask if we use hay caps. We do; and find the advantage great. For instance: last season, we cocked up a lot of hay on Saturday night and capped it. Sunday forenoon it began to rain, and it continued wet and lowery for five days. On the return of fair weather we found the capped hay bright. Other cocks in the vicinity uncapped, were soaked through and blackened, so that it was not worth half price. Good hay was worth here last spring, eighty cents per hundred. If an expenditure of twenty-five cents for a hay cap, saved forty cents worth of hay in that one storm, it must be apparent to the most obtuse, that it *paid*. The cap is simply a square of cotton cloth (fifty-four inches) with a stone in each corner. Have used salt, but am not satisfied that it is advantageous in saving the hay. In former years, while living in the vicinity of salt marshes, I have noticed that hay cut thereon, though much salter than I wish to make my fodder, needed *drying* to preserve it. But my experiments on this point have not been very minute.

Perhaps the farmer who has a good deal of hay to cut, loses little or nothing by beginning a *little* before grass has attained its "best estate;" because such fodder is "loosening" and acts medicinally upon stock; and if fed out during our long winters, judiciously, proves as valuable as if all the fodder was more matured. And if a portion of his grass has pretty well ripened its heads before he

can cut it, in many cases the growth of the "bottom," with the provender in the seed, will nearly compensate for the loss on the stalks which have ripened."

By E. K. French, Chesterville.

"With regard to *hay-making*, I will give my own practice. In curing herdsgrass or redtop, I cut and spread out evenly in the forenoon, rake up and cock in the afternoon, open the next forenoon sufficiently to finish drying by noon, and then get in. Late in the season we not unfrequently cut and get in the same day. This kind of hay should be sufficiently dry to keep perfectly sweet without salt or lime, a point too often neglected by farmers when they begin haying. Clover, let remain in the swath till about sunset, then turn over, exposing the green side to the dew—rake and cock the next day and let it remain in cock till it requires little, *or better*, no drying to prepare it for getting into the barn. For *neat stock*, there should be sufficient moisture left in the hay to cause it to mat together well; the cattle seem to relish it better than when dry.

If I could have *all* my grass cut when I wanted it, it would be immediately after the bulk of the grass was out of blossom—when the seed is said to be "full in the milk." Then the plant has perfected itself—the juices of the stalk are matured, and, as the seed is developed, these will be consumed to the detriment of the former. Hay that is cured too early is wanting in substance. Cattle cannot perform so much labor, or keep in so good heart, as when fed upon the hay from fully matured grasses.

If grass be cut before the second crop starts, the roots are much more likely to be sunburnt than when a vigorous undergrowth has commenced. We have had some pieces of "new ground" nearly destroyed by cutting too early, and I may here remark that the second crop starts up about the time the first goes into blossom. I give it as my opinion that double the loss is sustained by cutting grass too early than by cutting too late, for in the late cutting we always have the benefit of the undergrowth which at the time of early cutting has not appeared.

From observation of the effect produced, I am of the opinion that grass should not be cut off below the lower joint, say two inches in hight When cut close to the root, the heat of the sun parches it up, and in a measure kills them out. I have seen instances of this

repeatedly on our own farm, and am satisfied close cutting was the cause.

Clover hay, cured as before described, requires about four quarts of salt to the ton, but other kinds when properly dried are better without the salt than with it. It was formerly our practice to use salt with all kinds of hay, but latterly we prefer to mix clean, dry straw, if we have it, with hay that is not sufficiently made to pack down by itself.

We have not top-dressed either our grass or pasture lands to any extent, but intend to do so as soon as my arrangements for that can be carried into effect. I have graded my barn-yard of a gradual slope from the back side of it to the bottom of the manure vaults, so that all the wash is carried directly to them, and by means of a drain leading to the side-hill I can irrigate two or three acres in this manner, or by closing the mouth of it, allowing only the surplus to escape; and by means of a pump placed in each vault, I intend to pump the water up into sprinklers to be carried out and distributed over the grass land. I think that pastures are not cared for enough, but are allowed to be overrun with bushes, briars and thistles. They should be kept clean as a mowing field."

By J. O. Kyes, North Jay.

"In curing herdsgrass and redtop, I mow in the forenoon and in the afternoon rake it and put in bunches of seventy-five pounds—put caps on and let them stand until the next forenoon after the dew is off, then open and as soon as it is dry enough get it in. Clover I let stand in bunches one or two days before I open it; prefer to cut my grass when it is full in bloom; cut four or five inches from the ground, or high enough to keep the sun from drying the roots so as to kill them. Early cut hay is worth from two to four dollars per ton more than late cut. For hay caps I get common cotton cloth, one and a half yards wide, and take a square of it, make eyelet holes, in each corner put a string six inches long, fasten to them a stick eighteen inches in length, and my caps are made. I think hay caps pay for themselves on an average, as often as once in two years."

By James Walker, Fryeburg.

"If grass is the only object, I would sow grass seed alone; but to prepare the land for a good crop of hay, it is necessary to man-

ure and cultivate, and the quickest return for this is by a grain crop; for we put on a very moderate quantity of seed. Wheat is the best for spring sowing, and winter rye for autumn sowing.

We have on the Saco river, large tracts of low meadows and intervales, which yield various grasses both wild and cultivated, the hay from which is from a third to three fourths the value of English hay, and affords a pretty good security against short crops of that. On these natural meadows, where permanency is required, too early cutting is very injurious, especially in dry seasons, by exposing the surface of the ground to the scorching *sun*. As a general rule, four inches is the best hight at which to cut, because the stubble protects the roots from the hot sun by day, and retains the moisture at night.

When I can have hay well dried, salt should not be used. Too much salt is injurious to cattle in winter, and I prefer salting cattle in some other way.

Horse rakes of various kinds are used in this vicinity; the revolver for smooth lands, is best; spring tooth for rough ground. A good horse rake well managed, is equal to six or seven men with common hand rakes. I furnished a partial supply of hay caps this year, four feet square, which answered a good purpose, at an expense of twenty cents each, but have had very little use for them, this season, unless to prevent the hay from drying *too much*.

I have made two under drains, thirty five or forty rods each, in length, with decided advantage every way. It took up a quantity of worthless stones with which I made the drain which carried off the surplus water admirably. Wet meadows are very much benefited by ditching. If proper attention was given to ditching and underdraining, I venture to say that West Oxford would be as good a hay country as any other of the same extent of territory, within the State. I see no reason why the raising of sheep in this region, would not be as profitable as any where else in Maine. If rightly attended to, they can be kept wholly on what *we call meadow hay* in winter, and on our hill-side pastures in summer. I have come to the conclusion, after actual and careful observation, that corn fodder is worth more for the winter food of sheep, than for any other cattle. Give me low meadow hay of the right sort, with corn fodder for a change, and I can keep sheep, in large or small flocks, in good condition, without other feed."

By Cyrus R. Morton, Union.

"At a meeting of the Farmers' Club of this place, to consider some of the questions of your circular, it was decided, that it was better to seed grass lands in spring, and as early as possible, sowing grain also, (wheat the best.)

Two methods of curing Timothy and Redtop were advocated: first, by spreading out the first day and cocking up at night; open the next day and make just enough to keep in the barn. The other, to make it in the cock—a small majority in favor of the first mode.

Two methods of curing clover also: first, by letting it remain in the swath the first day, turning it at night; the next day cock it up, and haul it in the third day; and next, to mow one day and haul in the next, putting a peck of salt to the ton—about the same majority in favor of the first method. A minority believed that it is best to cut as soon as the seed is formed—being more hearty and nutritious. The majority were in favor of cutting when in bloom, as cattle like it better, the hay will do them more good and the future crops are better for early cutting, and the grass holds out longer.

Decided unanimously to cut as close as possible—as more hay is obtained, and the roots less liable to die out.

Use Paschal's patent revolving horse rake, with a saving of three fourths of the labor. The Kent's patent spring tooth rake saves a third of the labor.

To top dress with three cords of manure and a bushel of plaster to the acre, will increase the crop one half, on poor mowing.

It is *very injurious* to feed off mowing fields."

By Samuel Butman, Plymouth.

"From my experience in seeding to grass, I much prefer the spring. I have seeded several times in September, and sometimes with good success; but nearly one half the seasons, it has proved an entire failure. I have seldom, if ever, failed of a fair crop of grass, when seeding down in the spring.

I think it safe to sow grass seed with grain; but I prefer wheat or barley to any other kind. I am unable to state why grass succeeds with me better, when sown with wheat or barley, than with any other kind of grain.

In curing my Herdsgrass and Redtop, I uniformly give it the

best part of two hay days, after it is cut, before I cart it to the barn—always securing it as well as I can, from the weather, the first night, by raking and putting into bundles. The second day, I open, spread, and turn it, before carting it to the barn in the afternoon.

My clover hay, I always make in small bundles in the field—never spread it over the ground—but pitch the bundles over occasionally, by reversing the hay; and when partially made, put two bundles together; and always handle carefully to save the better part of the hay. And I consider clover hay, if well saved in this way, as valuable as any other kind, unless it is a very coarse, pea-vine kind of clover.

I prefer to cut my herdsgrass when in full blossom, and my clover when the blossoms are turned, one fourth or one third of them.

I prefer to cut my grass early, because I consider such hay much more valuable, and the after crop starts more readily, consequently the roots are better protected. The loss from late cutting, far exceeds the losses from early cutting.

In mowing grass, I cannot fix upon any precise rule, as to cutting it high or low. Good mowers do not cut their grass alike in this respect. I would not however, cut my grass very low, neither would I cut it so high that the field would look slovenly, when the hay is harvested.

I generally use four quarts of salt to the ton, but only on one half of my hay, as I house it; have never used any lime.

I use a revolving horse rake to much advantage, on smooth fields. I prefer them much to any iron spring tooth rake, I have ever seen. I have not used hay caps, but I think so highly of them, that I have resolved not to do without them another year."

REPORTS.

In accordance with the Resolve passed by the Board, near the close of its late session, (see page 59,) the following papers have been furnished for publication.

On Sheep.

By J. F. Anderson, South Windham.

Charged by the Board of Agriculture, with the duty of reporting upon "Sheep," I have diligently sought for knowledge upon the subject; but not having had the large experience of the gentleman who was last year entrusted with this duty, and not possessing sufficiently good opportunities of obtaining reliable information requisite without such experience, I cannot hope that my report will prove more than a passing word upon this important branch of live stock.

Throughout the history of farm improvement, we may observe a prominent place accorded to sheep husbandry. All agricultural writers agree in assigning to this agency, the most rapidly marked and surest consequences in advancing the general fertility of farming land. The rank sward of the richest lea is improved, and the hard and innutritious herbage of the almost barren hill top becomes sweet and nourishing after being subjected to this influence.

Says the Swedish proverb, "Sheep have golden feet, and wherever the print of them appears, the soil is turned into gold."

While most of our farmers will, upon reflection, freely admit that live stock breeding ought to receive far more attention than it has hitherto; and while they unhesitatingly allow that, of all, sheep breeding is the most profitable in appropriate places, how few there are in the State, who act upon the thoughts which deliberation thus brings out from their own reason and observation. It seems to pass each one, like a point in his parson's discourse, as so applicable to a neighbor, that it is astonishing *he* should continue to neglect his true interest; but a practical application to his own condition, only enters his mind as a very general proposition, in considering which, —if he dwells upon it at all—he satisfies himself with abundant

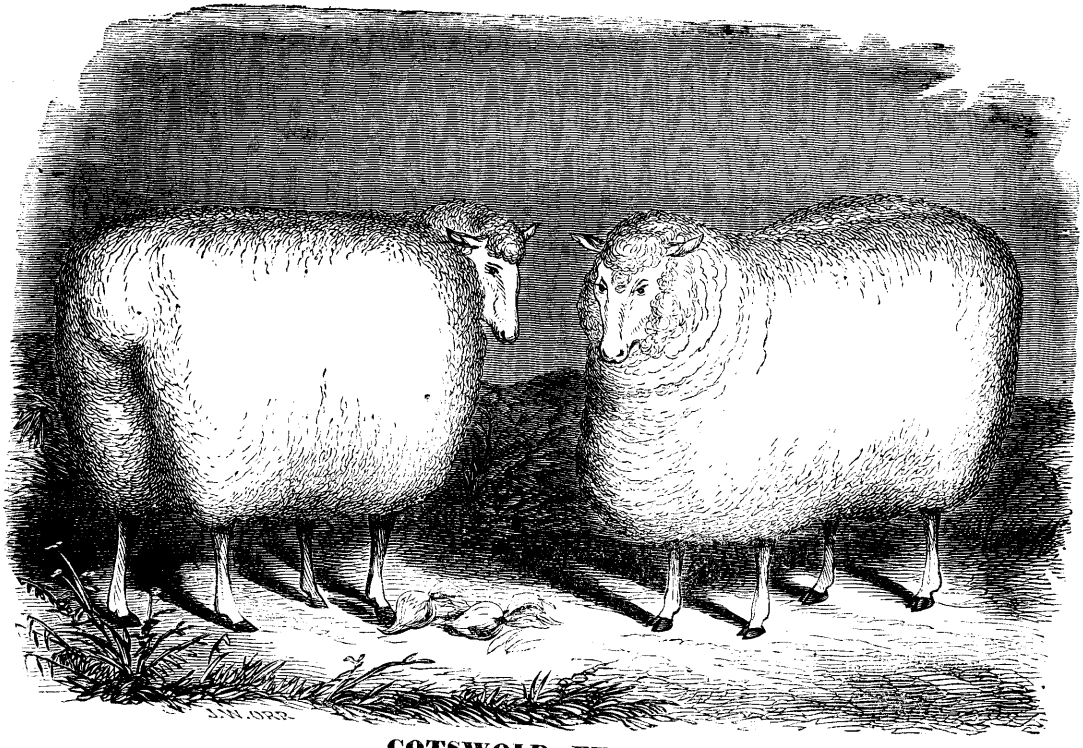
reasons of present expediency against changing his practice. Why is it so peculiarly the case with the American farmer, not only in this, but in everything pertaining to his legitimate business, that when he reasons so well, he acts so lamely? Why should not a reasonable, money-promising idea prove the same powerful incentive to action in his own proper pursuit, that it does in another?

Here will be enumerated incontrovertible facts about sheep keeping; every farmer knows them, but comparatively very few test them fairly by practice. Of those who have undertaken the breeding of sheep, a still smaller proportion have had the resolution to hold over a year's depression in the price of wool, notwithstanding the figures of an accurate account might discover a profit from them in the seasons of lowest prices. Having become somewhat accustomed to more than fifty per cent. return, the breeders are unwilling to take up with so little as ten per centum. It may be safely asserted that where an account with the sheep has been fairly kept, there can be shown but two contingencies which have ever brought the per centage of profit so low, in the hardest years, as ten per cent. of the flock's value; and those are *dogs* and *disease*.

There is not a farm or a farmer in the State, away from the city suburb, that would not gain from having more or less of these land improving, food and raiment producing animals; not a pasture which would not be clearer of coarse herbage and bushes, and all the better by their close feeding, and which would not gain from their evenly spread, plant nourishing excrements.

No farm stock, no farm, is complete without them. This is asserted for application to every farm in Maine. But the peculiar position, circumstances and condition of each one must, of course, govern as to the proper number which may be kept upon it. It has been said by one who should know, that "for every cow, *any* pasture can carry a sheep with absolute gain."

This truly may be borne in mind, that it is a result of the most general experience, that sheep can every where be kept to a profitable extent, the limit of which can only be ascertained by a fair trial with gradually increasing numbers. On the farm which proves, from its peculiarly favorable character, well adapted to sheep, the same experience teaches that no branch of husbandry is so richly remunerative, none in which there is so little risk, none where the



COTSWOLD EWES.

Bred by George Fletcher of Shipton Sollars, (Eng.) Imported by and the property of George C. Hitchcock, Ash Grove, New Preston, Conn.

capital invested can be so readily increased or diminished according to increased or diminished demand, none where so little labor of body or mind is required, and none where the returns are so frequent and sure.

Wool makes a healthier clothing than cotton, and mutton is a very cheap and wholsome meat. This is a consideration worthy of fixed attention from each inhabitant of every agricultural town in the "Union." The owner of a flock of sheep can have fresh meat, of the best character, throughout the year; he can at any time, kill a lamb or wether, without damage or loss, and have a pelt to sell, with meat that becomes more palatable from keeping, and in quantity sufficient, without his being encumbered by its weight, or annoyed about its disposal, so frequently the case of the farmer who butchers a neat animal. It is believed that this substitution of fresh lamb and mutton for the vast quantities of salt pork now consumed in our farming communities, would be as happy an innovation here, as it proved in England. "The farmer raising wool can have, at his own door, cash at prices not more than from five to ten per cent. lower than at the best markets, and if wool happens to be unusually low, can store it for one per cent. of its value, with an assurance that he loses nothing of weight." By instituting and encouraging the system of "wool depots," which has already gone into successful operation in Vermont and New Hampshire, a still less per centage off the best market price, even, may be obtained, and equal prices, according to quality, might be had throughout the country. Without such institutions, wool raisers must continue to rely upon the integrity and knowledge of the few isolated, woollen factory owners and wool pullers, scattered about the country, who now name their own prices, and frequently evince a want of discrimination which tells against either one or the other of those desirable qualifications.

The design of this report, is not to dictate nor even to recommend in detail, a definite course of action, but in calling thoughtful attention to the subject of sheep breeding, to lend such aid as it may, to farmers looking in this direction; to offer a word of encouragement, and perhaps, to open up some unsettled questions for general discussion among able and experienced men.

The Board of Agriculture has signified its intention, not to be committed to the advocacy of either breed of the several kinds of

live stock. While the writer of this report hopes that nothing here, will warrant a thought on the part of any one, that there is a departure from so judicious a determination, still, it has seemed to him no more than just, that where the whole field of Maine has been allotted to a particular breed upon the mere ipse dixit of one individual, however learned he may be, the action of the Board should open the gate for a fair and free discussion among its members and the farmers of the State, so that if the theory, which militates against the practice of a general experience, be correct, those who have *unfortunately* been making money in so unwarrantable and unscientific a course, may be able to obtain *reasons* for the substitution of a single breed in place of those which, for aught they can see, are every way well suited to their markets, their climate, and their soil.

In an essay upon Sheep breeding, published in the Patent Office Report for the year 1851, P. A. Brown, L. L. D., maintains that there are two distinct *species* of sheep—the woolly and the hairy—each of which has its appropriate place, where the other must not intrude. And to but a dozen or so of all the sheep which there are in Maine, would he accord an abiding place upon the earth, because they have hair mixed with their wool, and by that same token, according to his theory, are hybrids. He says, "There is a place for all natural things. There is a place to breed and raise the hairy sheep; and there is a place to breed and raise the woolly sheep; but for the hybrid sheep, which is not a natural, but an unnatural production of man's making, there is not any place in the United States; and therefore their propagation ought not to be encouraged. If a line be drawn diagonally through the United States, beginning at the south east corner of New Hampshire, pursuing pretty much the course of the line of tide water, and ending in Texas, it will be found that every where north west of it, the woolly sheep may be bred and will thrive, *provided the blood of his species be kept pure;* and every where south east of this line, the hairy sheep may be bred and will thrive, *provided the blood of his species be kept pure;* but that neither will thrive on the other sides, respectively, of that line, *nor will they if the species are crossed.*"

Dr. Brown illustrates his argument for this distinction of species

by referring to the general similitude of the horse and the ass, the zebra, the quagga, the onagga, the dziggatai, the two species of camel, the two species of rhinoceros, the several species of the deer kind, of monkeys, of sloths, and of lizards; but none of these change in those particulars which causes distinction between them, whereas there exists realiable and abundant authority to prove that the wool and hair of sheep do change from either one to the other, under the influences of climate and cultivation.

Dr. Nichols, in his "Catechism of Natural Theology," page 144, says, "what art does for man, nature has in many instances, done for those animals which are incapable of art. The clothing of its own accord changes with their necessities. This is particularly the case with that large tribe of quadrupeds which are covered with furs. Every dealer in hare skins and rabbit skins, knows, how the fur is thickened by the approach of winter. It seems to be a part of the same constitution and the same design, that wool, in hot countries, degenerates, as it is called, but in truth, (most happily for the animal's ease,) passes into hair; whilst on the contrary, that hair, in the dogs of the polar regions, is turned into wool, or something very like it."

Dr. Blacklock, in his "Treatise upon Sheep," p. 85, says, "in tropical countries we find the fleece approaching more to hair than wool, as in the sheep of Thibet, so celebrated for the silky nature of their coat."

In Saxton's edition of Youatt upon Sheep, p. 11, is the following: "The change from hair to wool, though much influenced by temperature, has been chiefly effected by cultivation."

Prof. Low, in his "Domestic Animals," p. 42, says, "By frequent shearing of the fleece, the hair diminishes in quantity, and the wool is proportionally developed, until at length, under the influence of continued domestication, the essential covering of the animal becomes wool, of greater or less tenuity and softness."

Charles L. Fleischman, Esq., in the Patent Office Report of 1847, p. 308, says, "The wool of the very same sheep, which furnish in Germany an eminently fine and valuable product, on their being transplanted to other countries, can scarcely be recognized, and is hardly worth half its former value."

And D. J. Browne in the Patent Office Report for 1855, p. 2,

says, "If sheep are carried from either of the temperate zones to the burning plains of the tropics, after a few years, material changes take place in their covering."

[Dr. Browne, quoting Prof. Agassiz, (Prin. of Zoology, p. 43,) infers therefrom, "that the hair of the hairy sheep, and the wool of the woolly sheep, according to his (Agassiz') notion, depend upon an immaterial principle, which no external influence can prevent or modify." It is to be regretted, that in a matter of such importance, the opinion of that eminent naturalist was not obtained directly touching the point, so that it need not have been left to an inference which—craving Dr. B's. indulgence—might to some, seem rather "remote."]

Dr. Brown asserts, that "this change of coat never happens to either the pure hairy sheep, or the pure woolly sheep, but is a condition of those hybrids which have already hair and wool."

Fleischman again says, (P. O. R., 1847, p. 275,) "But besides the peculiar wool, all sheep have, in particular places of their bodies, real hairs, some more, some less." And it may be fairly deduced from the teachings of all the essays and treatises to which the writer of this Report has had access, that there are no sheep bearing fleeces composed exclusively of either hair or wool; but that on the shanks and about the heads of the finest wooled sheep of Saxony, there may be found filaments approaching very closely to true hair; and that it is only by the greatest watchfulness and care, even where the climate is the most uniform, that the 'constant and thorough' character of their fleeces is maintained; and that some mature merino sheep, with woolly fleeces of the most perfect integrity, exhibited when they were lambs, very hairy indications; and that wherever neglected, or where the climate is variable and they are exposed to sudden vicissitudes of temperature, they will deteriorate, and occasionally a hairy sheep will appear in the flock. Reliable authority also informs us, that we may sometimes observe one end of the same fibre to be wool, with its spiral form and felting properties, while the other end is true hair; and that clothing and greasing are resorted to with a very evident effect upon the quality of the wool.

To men of ordinary judgment, the case of the South Down sheep, which Dr. Browne, citing, speaks of as an hybrid between the hairy

and the woolly sheep, seems a notable instance *against* his theory; for they not only have become a distinct and self supporting breed, but have been for years improving in form and constitution; an improvement effected within the breed itself, by abstaining from intermixture with or draft from what he calls the pure species. And according to Lyell, (Prin. of Geology, p. 579,) "the celebrated John Hunter has observed, that the true distinction of species must ultimately be gathered from their incapacity of propagating with each other and producing offspring capable of again continuing itself." And Lyell from many eminent authorities and much close reasoning, draws several "inferences in regard to the reality of species in nature;" the following being a part of the fifth: (Ibid p. 589.) "It does not appear that true hybrid races have ever been perpetuated for several generations, even by the assistance of man; for the cases usually cited relate to the crossing of mules with individuals of pure species, and not to the intermixture of hybrid with hybrid."

Again Dr. Browne argues against crossing together different varieties of the same species, and in this connection he asserts, "the Arabian is the finest race (of horses) in the world; in his own country no one ever thinks of crossing the breed; on the contrary, the pure blood has descended, uncontaminated, through successive generations; but in this and other countries, where the practice of amalgamation with other races prevails, they have endless varieties of this noble animal, but no pure Arabian race."

Would it not be pertinent and in accordance with fact, if we should assert that we have none of the pure Arabian race merely because our climate changes the animal here into an Americo Arabian, without the capacity, and every way unfit for the requirements of our people? But has not each section of our country a breed of horses admirably suited to the wants of the respective localities, produced by this very amalgamation of races and breeds? From a conscientious belief in its reliability, this is assumed as fact; and it is proposed to apply the same process to sheep breeding in Maine, with a thorough persuasion of its ultimate success. It cannot be reasonably doubted, that we may obtain equally favorable results from the various breeds of sheep prevailing in different parts of the State, by selecting such as appear to thrive best in each section,

whether long or short, or middle woolled; whether hairy or woolly, or a more even mixture of the two extreme varieties. In plain words, let us take the sheep as we find them, *good*, and build up fitting varieties by nice selections, vigilance and suitable food.

The true question appears to be, not whether Maine, like Saxony, is capable of raising sheep which shall produce wool of a maximum degree of fineness, without regard to the cost; but, what varieties of sheep are by their nature best adapted to our climate and soil, to the general condition and situation of our farms, and which will at the least risk and cost, make the greatest return in federal money.

It may be that Dr. Browne is correct in assigning to Maine, the Merino. They are certainly fast growing into favor in those counties where the most attention is given to large flocks of sheep; while in the immediate vicinity of each great market of the State, the mutton sheep—South Downs, Cotswolds, Oxfordshire Downs, and the hairy Leicester, with its loose and open pile—are each paying large profits to their respective breeders.

Upon due consideration, it is recommended that every farmer in the State qualify himself, by his own practical experience and careful observation for argument upon (as it is assumed to be) the yet unsettled question, "What is the most suitable and best breed of sheep for Maine?" Let each one immediately procure more or less, as good as he can select, of the kind which seems to him fitted to his wants; then with a specimen of each fleece in hand, numbered to correspond to a number upon the sheep from which it came, consult some intelligent wool sorter, and thus learn which ones are of nearly uniform quality; then with the aid of his friend the butcher, choose from the '*select*,' those which develop the fullest proportions, and the most perfect forms, and thus determine upon his breeding ewes; after which he should not hesitate to put himself to still greater trouble, or even to a considerable expense, to procure an active buck of robust health, excelling in that quality of wool towards which he intends to breed. This is particularly urged because all the authorities agree in attributing to the buck the greater effect upon the wool, and many consider his influence paramount in conveying all qualities to the progeny. Let him, in both buck and ewes obtain as thick a fleece as possible, always rejecting one that has the wool thin and open along the back, and the belly bare or imperfectly covered.

By pursuing this course for a few years, he will not only be able to throw light upon a dark question and aid his brother farmers to an important decision, but he will find that he has made a profitable investment pecuniarily, and if it happens that he has bred in the right direction for his locality, *and the neighborhood is not infested with dogs*, his progress to wealth will be opposed only by the extent of his farm.

In sheep keeping it should never be lost sight of, that these ranging animals require a frequent change of pasture, more than any other sort of live stock, and that they never fail to pay handsomely for every such change. Blacklock says, "Nothing will conduce so much to the health of sheep, and to the speedy taking on of fat, as the frequent shifting of the flock. Disease will, doubtless still affect the animals, but illness will be rare, and mortality diminished, if by the care of their rulers, they are enabled to obtain what instinct tells them is the best of medicine." Judge Buel said, "Keep your sheep dry, give them pure air and plenty of food, and carry them to spring grass, by all means, in good flesh. Stint them not in salt, and feed turnips, potatoes and coarse grain occasionally, particularly to such as have to give suck."

The following extract from the Patent Office Report of 1851, p. 97, accredited to the "Wool Grower," was discovered after the above was penned. Identical as it is with much, corroborative of nearly all, that has been here advanced, and adding still more, it is hoped that it may give force, if not dignity, to this paper.

"Everywhere and anywhere the sheep will live and thrive, and, with proper care, pay more for the labor and capital invested, than any other animal or any other system of farming. It is one of the most useful and economical modes which have been given us to convert the vegetation of the farm to money. There is no animal in which there is so little waste or so little loss. For at least seven years of its life, it will give an annual fleece, to the value of the carcass, and the yearly increase will be nearly or quite equal to the cost of keeping, giving as a general thing, a profit of cent per cent. Of all the other animals, the cow comes nearest to the sheep, in the profit it returns to the farmer, if well cared for; it will pay for itself each year, by the milk it yields, and defray also the cost of keeping. We aver, without fear of contradiction in truth, that there

is hardly a locality in the whole Union, where any kind of farm animals can subsist, that the sheep, if properly attended to, will not give a net profit on the investment, of at least fifty per cent., and that with the ordinary management of farms, it will give some twenty to forty per cent. * * * We cannot glut the market, nor will there be any long time that the market will be depressed below a point of profitable production. On the contrary, it is certain that no farm product goes less below that point, than wool." The last position advanced above, brings to mind the statement in a late journal, that while the sheep of Great Britain had doubled in number, during the last one hundred years, the price of wool per pound, had also doubled, and the price of mutton had quadrupled.

A reason has already been given for the reference made in this report to Dr. Browne's essay. It may be thought that too much space has been accorded to that; perhaps there has. But when it is considered that the Patent Office Reports are looked upon, by a great many farmers as almost standard works and text books upon such agricultural matters as they treat of, and that they are, more or less, in the possession of every neighborhood, it does seem to be a duty incumbent upon those publicly entrusted with a regard for these great interests, that they should not suffer to pass unchallenged any new and startling theory, the prevalence of which would very materially change the existing practice; but that all such ought to be fairly investigated upon their own intrinsic merits, and if the new doctrine then appears to be correct, the practice might more reasonably and confidently be adopted, than it could upon a dogmatical assertion of its truth.

Marine Manures.

By Samuel Wasson, Franklin.

With neither time or inclination to indulge in doubtful or speculative theories, I can only indite such deductions as have been drawn from experience and observation. Marine manures, in common parlance, are rock-weed, kelp, eel-grass, muscle-bed, and pogy chum. Rock-weed and kelp grow upon the rocks and ledges of an "open" shore. Eel-grass, upon the "flats," left dry at low water. Muscles

are formed in beds, varying in size, from half an acre to ten acres, and in depth, from one foot to five feet. Chum is the remains of the fish called pogy or menhaden, after the oil is pressed out, and somewhat resembles fine chopped hay.

Prof. Johnston says, "sea-weed contains potash, soda, sulphuric acid, salt and magnesia, the predominating constituents being potash, sulphuric acid, and salt;" substances needed by crops. A prime compost, especially for seeding-down, is made of rock-weed and muck, mixed in alternate layers. Fresh rock-weed, spread over newly-sown turnips, is a sure preventive against the ravages of the fly, and the turnip will be smooth and fair as a maiden's brow. As a top-dressing, it is fast going into disuse, an impression prevailing that it "drives" the land. The fairest and best flavored potatoes, grown along shore, are raised upon eel-grass. Complaint is yet to be made of the rot affecting potatoes planted upon it, although the yield is much less than on yard manure. The only objection to eel-grass is, that it takes too long to decompose, but if mixed with lime—which increases its manurial value—it will rot as quick as straw. Some of my thriftiest potatoes are growing upon this mixture, it having been in stack but fourteen days. For wet, heavy, adhesive soil, it is first rate to make it dry, light and friable. With both rock-weed and eel-grass, their "virtues are many, and vices few." Of muscle-bed, our farmers, one and all, acknowledge its merits, yet but few practically appreciate its worth, while it is neglected by many, and mis-applied by others. As a top-dressing for grass on clay soil, among the long list of concentrated manures, it has no compeer; rapid and energetic in its action, and durable in its effects. Land, that for years has only grown wire-grass and white-weed, will, immediately after its application, produce a luxuriant crop of Timothy.

On a field in western Hancock, liberally dressed during the winter of the "Aroostook war," its influence is still perceivable. To spread broadcast, it is preferable to bone, superphosphate or guano. It must, however, be hauled during cold weather, so as to freeze, or it is valueless. Nature seems to have made those deposits especially to renovate worn-out grass lands.

For several years, some few of our maratime farmers have devoted a month or two after haying, to the catching of pogies for the oil,

proving a profitable business. Yankee-like, everybody is into it, saving (oil) at the spigot, but wasting (chum) at the bung. But within a few years, either experiment or accident discovered that the chum—hitherto food for maggots—would furnish an important source of fertility, as it decomposed rapidly, and acted with great energy in hastening the growth of plants. Some of the more knowing ones began to spread it upon their mowing fields, and of the result, "seeing is to believe." Upon sandy fields, where grass "no-how wouldn't" grow, a single year's spreading produced two tons per acre. If applied consecutively, it will after a year or two impart a fishy taste to the hay not relished by cattle.

As the "hite" of fishing is in the heat of summer, when the chum cannot be preserved any length of time, sufficient care is not had in spreading—the spreader, for the time, being more of fisherman than farmer—hence the cause for the complaint.

In the compost heap or elsewhere, above the sea or underneath, it will make its mark. When science shall discover how to preserve it as an article of commerce, pogies will be caught for the chum and not for the oil. Already it is known that if immediately from the press it is packed in good barrels and *salted with lime*, it will keep for several weeks.

That down in the "deep caverns of the briny sea" there are other forms of fertility, there's no doubt, but 'till those already known are fully appreciated and properly applied, why should Neptune be invoked to "give, give?"

Marine Manures.

By B. C. Bailey, Bath.

With regard to these, I will at present merely say, that the kinds used in this vicinity are taken from the bed of Stevens' or New Meadow's River, so called, when the tide is out, at low water, and from the inlets and coves, or arms of the sea around and about the sea shore, and from the rocks and islands about the shore at low water.

Stevens' or New Meadow's River, is an arm of the sea running inland perhaps eight or ten miles, with no fresh water streams running into it of any note, leaving the bed of the river very much im-

pregnated with salt, and in many places the mud is filled with small clams and muscles. The bed is sand, clay and soil, the deposits of the shores around.

There are localities on these bottoms which apparently are all clay. Some of these spots have been selected to transport from, and spread upon soils adjoining, and have never produced good effect, while mud, clams, and muscles, taken in the vicinity of these clay bottoms, have invariably produced good.

The uses made of these manures, and the effects produced from them, so far as I have been informed, are as follows:

The bottom of these bays, inlets, or rivers, or rather the top of these deposits, when the tide is ebbed out, has been taken in the winter and carried on to the mowing fields, or grass lands, and cultivated grounds, spread in the spring, and the effect is very apparent. If spread upon a worn-out field of clay loam, it invariably produces a crop of clover. If spread upon a sandy or gravelly loam, it produces clover and herds grass. If the land is very much worn out, and covered with white weed, it will very much diminish the white weed, and enlarge the crop of clover; and this without ploughing or sowing any seed.

Rock-weed, as it is called, spread on old worn-out fields, of a gravelly soil, produces a crop of timothy or herds grass. If put on a clay loam, it will produce clover and herds grass.

I have statements from quite a number of individuals giving me this result, besides, I have examined quite a number of localities which showed the effects produced.

I had a piece of old worn out field or pasture, of about one and one-quarter acre, on which, in the winter, I put a quantity of mud taken from our docks, where the water is almost fresh, very slightly brackish, and spread it in the spring. The land last year, presented nothing but white weed and poverty grass, as it is called, and very little of that. This year, it came up with the same, and run quite tall; but now, at the date I am writing, (June 21st,) a very thick coat of clover is coming up, the kind I cannot say, as it is not headed, but I think it the red clover. This fact is so evident, that I have called the attention of an old farmer, who has lived on the spot a number of years. He don't know what to make of it. He thinks I must have sown clover seed in the night-time. I can assure you

there has not been an item of seed put on this ground for the last ten years, and was what is called old worn out land.

In connection with this topic, is added the following, on

Sea Weed.

By S. P. Mayberry, Cape Elizabeth.

We farmers have a great and growing antipathy to the term *weed*, and cannot help coming to the belief that the lexicographers were not following their own nose when they defined weed as an herb "noxious or useless," (another lexicographer better defines a weed to be "a plant out of place," and what are usually termed sea-weeds, would be more properly called Marine plants. Ed.) as we apprehend such an anomaly as a weed, in the sense entertained by them, had no place in nature. The farmer comes to a different conclusion, and would define a weed as an agent for gathering, arranging, and storing up matter below the reach of, and intangible to, animal and the higher grades of vegetable life, thus fulfilling a great and mighty end in the scheme of creation—the gathering together of the stray substances which amid nature's varied manufactures has, as it were, slipped through her fingers, and would have run to waste, and converting them, by sure and certain processes, into tangible compounds.

In the article of sea weeds, we are particularly struck with the economy of nature, in singularly adapting the means to the end. The office of these plants is to collect the stray substances held in solution by salt water, particularly the alkalies and phosphates, and as these have to be extracted from the water, not from the earth beneath it, the plants have no roots, properly speaking, but simply processes for clinging to hard and flinty rocks, as points of attachment; while at the same time, in place of a firm and erect stem to keep the branches and leaves expanded, as terrestrial plants, and which would be cumbrous and unhandy for plants which change these mediums as often and as regularly as the tides, they are furnished with innumerable air bags, or vessels for accomplishing this purpose, so that the branches and leaves of the plant may come in contact with the greatest possible quantity of water consistent with

its size—these air vessels, serving the double purpose of furthering the plant in its destined office, and when this is accomplished, floating it to our shores to be applied to useful purposes.

In riding around in the vicinity of our sea coast, one is struck with the immense quantities of it that are carted for the purpose of manuring the fields; and when we think that in this town, which raises as many vegetables, except potatoes, as the rest of the county, for marketing, and the number of people who live upon those vegetables which are raised almost exclusively by this manure, we must come to the conclusion that the *sea weeds* are a tribe of plants of vast importance to a large section of the population of this State, at least, and when taken with the sterile soil around our coast, almost invaluable, as no species of manure reduces itself to a state for use so quickly.

With these views, I need not say that I believe an increase of the use by farmers, in the vicinity of our coast, of this valuable *weed*, would be a very great blessing and advantage, and would form a permanent source to supply us with manure.

On the Renovation of Worn out Lands.

By E. L. Hammond, Atkinson.

To S. L. Goodale, Esq. Secretary, &c.

Dear Sir:—Yours of the 25th ult., calling my attention to the fact that the Board of Agriculture at their session last winter, made it my duty to furnish you with a paper on the subject of the renovation of worn out or exhausted soils, is received.

To me this is an interesting subject, and one I believe that is engaging the attention of the farming community to some extent, and I regret that I am not able to do it the justice its importance demands.

From an examination of the reports and documents already published on this subject, I find much valuable information; and it appears to me that all that is immediately necessary, is a wider diffusion of the light already thrown upon it, and corresponding practice. Even a limited consideration of the importance of the subject, embracing as it does, the different properties of soils, so as

to meet the wants of its productions and bring them to perfection, with the least possible human effort, and least detriment by exhausting its plant-sustaining elements, may satisfy any one that the subject is not yet exhausted. And it would be a matter of no surprise, if new and important truths should hereafter be developed, and our theories be entirely superceded by an improved science conducive to new practice.

Yet it is very evident that our only present safe course is to practice upon what light we have, to make the most of the means within our reach, and to advance in the right direction as fast as possible. It appears to me that the question to be considered—to wit, the renovation of worn out lands—embraces directly or indirectly almost every branch of agriculture.

It depends not only upon properly working the soil, but also upon the making and application of manures, keeping stock, rotation of crops, labor saving implements, industry, economy, and such an application of time and talent as is necessary to successful business of any kind, especially to men who start in life with every thing to gain and nothing to lose.

Fortunately the main divisions of this subject, relating to stock, manures, &c., have been committed by the Board to abler hands; a correct knowledge of which I deem to be all that is necessary, with corresponding practice, to restore the exhausted farms to their original capabilities. I presume it will be admitted that where a correct system of farming has been pursued, the farm has not been exhausted; consequently an investigation of the causes of this deterioration may lead (in most, if not in all cases) directly to the remedy.

In a majority of cases, I think it will be found that at the commencement, the farm was too large—that is, it was out of proportion to the means of carrying it on successfully. The low price of land in Maine, has induced many to purchase more land than they could cultivate to advantage, with the means at command, and this has conduced to much bad practice; such as, shallow plowing, a succession of same crops, grazing mowing lands in the spring and fall, selling the crops off the farm, instead of converting them into stock, and disposing of the proceeds of the dairy, pork, beef, &c., and what is of vast importance to the farmer, a neglect of the means within reach of accumulating fertilizers, by the proper use of muck, lime,

plaster, and the saving of the liquids, and all other wastes of the farm, which contain fertilizing properties.

Any mode of farming which does not return to the farm annually, that amount of plant sustaining elements drawn from it by the crops taken off, may be set down as bad management, and will soon show itself in the shape of worn out soil.

From what has come under my own observation, the conviction has been forced upon me, that many farms in Maine have deteriorated or become partially exhausted, not so much from a want of knowledge in farming, as from neglect in consequence of divided attention between farming and other business—especially is this the case in that part of the State contiguous to the timber lands. And here we have abundant evidence that farming is not a mean or small business, from the fact, that in those towns where farming has been the principal business, the people are decidedly the most prosperous and independent. I refer here, particularly to those farming towns in the neighborhood of the timber lands and sea board, in many of which farming has only been a partial business.

It is true that the renovation of an exhausted farm requires time, patience, perseverance and capital; and the larger stock a man has of these on hand, the sooner he may consummate his object; yet patience and perseverance will accomplish much in a short time, if rightly applied. In order to start right, it is well to make a map or plan of such a farm as we desire, or from situation and circumstances we can reasonably expect to make, and then direct our labor and efforts to accomplish our object as soon as possible. In my opinion it is highly important that a man should be a scientific, as well as a practical farmer. Science would render practice easier and more interesting.

It is sometimes found that apparently worn out lands, are not so much exhausted as they appear, and by a right application of means they are comparatively easily reclaimed; and he is thus aided in his operations, and knows how to profitably invest money. I think that a large majority of farms, at least in the northern counties of Maine, are of this class.

For instance, a succession of the same crop may have exhausted the soil of more or less of the elements necessary to sustain and mature such crops, and still retain the necessary elements to grow

some other. Again a variety of crops may have exhausted the surface soil of most of its plant sustaining properties where shoal plowing has been the practice, and the farmer considers his farm worn out, when, if he would deepen the cultivation a few inches, he would probably turn up to the action of air and water, many important elements necessary to sustain vegetation.

It has been contended by some, (I can hardly think they were practical agriculturists,) that the earth contains within itself all the elements of vegetation, and that it only required right practice in tilling the soil, to constantly bring out and mature the productions of the earth, without the aid of fertilizers; that as fast as the surface soil became exhausted, by bringing up a new soil which had lain dormant for a length of time, all the elements necessary to sustain vegetation were alternately reproduced and replaced, and that the process might be continued indefinitely.

In the renovation of worn out lands as well as in general farming, there is, no doubt, much to be gained by deep cultivation, and by frequently bringing to the surface some of the sub soil, or dead earth as it is frequently termed, and thoroughly mixing and pulverizing together; but the farmer who neglects to husband all his means to procure fertilizers, and manages to return to the soil the elements taken therefrom by his crops, however perfect his tillage or cultivation, will sooner or later find himself with a worn out farm; and if he cannot realize from his sales of stock, &c., quite as much ready cash, or make as quick turns as from the sales of produce, yet he can hardly fail to see what the end will be in the course pursued. Too much consequence can hardly be attached to the making, saving and application of manures, by those especially who have exhausted lands to renovate; and while I deem it of the first importance to the cultivator to make the most of his barn yard manure—which may be his chief dependence—yet I think in renovating worn out lands, much advantage may be derived from a right application of calcareous or other artificial manures. Gypsum, lime and wood ashes are cheap dressing, and pay well on most soils—perhaps best on dry loamy and gravelly. Most of the cereals and vegetables, partake largely of these, consequently exhausted soils to a greater or less extent are so, from too large a drain of them without return; and they can hardly be dipensed with in the recovery of soils so

impoverished, unless there is an abundant supply of barn yard manure at hand, which generally answers all purposes of fertility. Lime and salt mixed, in most soils may be used to good advantage on Indian corn, and on most if not all kinds of grain, especially wheat and barley. Ashes and salt make good dressing for potatoes and most other vegetables, and at the same time assist the grass crop for several years, or at least as long as it is profitable to mow land without changing its use, which I think, as a general rule, where farms will admit of it, should not be more than two or three years. I think I have seen good results this season, from the use of lime and salt mixed in proportion of one hundred pounds of salt dissolved in water with which three hundred pounds of quick lime was slaked dry, and mixed with about two bushels of gypsum; about twelve bushels of this mixture was spread on an acre of worn out land, with good success.

An acre of dry loamy land which had been mowed till it yielded less than a half ton of hay to the acre, was plowed two years since, about two inches deeper than before, and eight common cart loads of barn manure plowed in. Last season it yielded about one hundred and sixty bushels of potatoes, which were dressed with wood ashes, salt and gypsum, mixed in proportion of four bushels of ashes, one of gypsum and one of fine Liverpool salt, about one gill to each hill. This season it was twice plowed and once harrowed, and two and a half bushels of two rowed barley sowed upon it; at the same time there was spread upon it about ten bushels of the salt, lime and gypsum mixture, and harrowed twice more; and forty five bushels of barley was the yield, which was one third more than grew on the same kind of land adjoining, which was tolerably well manured last season for corn. It is evident here that the deepening of the cultivation, a more thorough mixture and stirring of the soil, and supplying it with those particular elements of which it had been exhausted, contributed mainly to the crop, which (it will be borne in mind) grew upon *worn out* land. The cost of this mixture did not exceed fifty cents per bushel, including five dollars per ton for freight. Lime and salt mixed in the above proportion, I think will generally be found useful when properly applied in renovating exhausted soils. Although the effects of such manures may not be so durable as barn manure, yet *whatever increases the crop*,

increases the means for supplying the defects of the soil, if the crop (as it should always be) *is consumed upon the farm.*

Artificial manures, such for instance, as lime, gypsum, wood ashes, salt, &c., are frequently condemned, because they were wrongly applied. It must be borne in mind that they do not contain all the elements found in barn manure; consequently their beneficial effects can only be realized on such soils as are deficient in those properties to be supplied by the dressing. If the soil is not deficient in lime, then lime cannot be applied to advantage; and the best way for farmers in general to acquaint themselves with the proper use of them on their own farms, is to experiment on a small scale. And especial regard, in experiments, should be had to *mixture* and *quantity* as well as *kind.* I think I have seen good results from salt and lime, mixed as before stated, applied to corn and potatoes; yet great care should be taken that but a small quantity comes in contact with the seed; and I have never known corn to suffer materially by the worm, where about half a table spoonful of it was carefully sprinkled over the seed *after* dropping; and when it is used as top dressing, it is better to put it around the plant, an inch or two from it. In this manner, a common handful of the salt, lime and plaster mixture, may be used to a hill of corn or potatoes. If the salt and lime mixture only, is used, a less quantity should be applied; two thirds will be sufficient.

I have witnessed apparently exhausted mowing lands materially improved by the application of three bushels of gypsum to the acre, at the same time abandoning the practice of grazing it in the spring and fall. Also lands which were used for pasture till almost useless, being covered with moss, restored to good profit by three years' cultivation, with the use of gypsum only, deepening the cultivation a little each year, and removing the loose rocks, at the same time obtaining a crop of oats and peas, sufficient to pay all the cost of renovation; and this year, which is the fourth since the process commenced, it yielded at least one and a half tons of hay per acre, and by a judicious system of rotation of crops, and at the same time returning in manures what the four years' crops have afforded, I cannot see why a high state of cultivation cannot be attained; at the same time receiving in the crops ample remuneration for all expense of labor and fertilizers. As before stated, the subject of renovating

worn out lands, embraces every department of agriculture, and can hardly be considered without encroaching upon the province of others who have the subject of manures, and so forth, committed to them. I have therefore felt myself at liberty to only make a few random remarks on the general subject of farming, and it may not be altogether inapplicable to the subject to consider its pecuniary importance.

It cannot have escaped general observation, that from some cause or other, many good farms have become more or less exhausted, and the owners have been induced to sell cheap, and emigrate to the western states. And it is still a question with many, whether it is better to renovate the exhausted soil, or emigrate to the new lands. It is evident at a glance, that much here would depend on circumstances. A man with very limited means, a man with a family which he wished to settle around him, or a young man beginning in life that wished to try his fortune in the vicissitudes and speculations incident to the growth of a new country, might find it for his interest to lay a foundation for the future in a new settlement, and wait for the results of time and chance, to increase his means with his necessities. On the other hand, a man somewhat advanced in life, and desirous to spend his remaining days in the enjoyment of privileges attained by society of maturer growth, or a man with but small means, may safely invest in a good soil, although somewhat exhausted, and find it both pleasurable and profitable to renovate and restore it to its original capabilities, and thus at once secure the privileges and pecuniary value which a well regulated society and accumulated and concentrated wealth give to it.

The improvements in the State, in agriculture, the exhibitions and the reports of crops of various kinds which have been raised on an acre of land, must sooner or later force the conviction on every careful observer, that a large class of farms in this State do not now yield one-fourth of their capabilities, and that the same amount of labor and capital now expended on the whole, might be more profitably expended on one-fourth part. I admit the reasoning of many of our farmers, that if a man can profitably farm on twenty-five acres of land, with hired labor, he can realize double the profit on fifty; or, that from circumstances, he might for a short time, realize more clear profit on the fifty acres. I admit that farming is a paying busi-

ness in Maine, and provided it is conducted upon true and correct principles, like every other good business, it is profitable according to its magnitude. I am well aware that to renovate an exhausted farm, and bring it into a desirable state of cultivation, requires time, labor, and capital in proportion to what is to be accomplished, and the size of the farm, in my opinion, should always be in proportion to the means of carrying it on; and the true principles of farming are, to make every acre produce *nearly* if not quite its entire capacity; (there may be an exception in regard to hay,) and although it may take some time to accomplish this, yet well directed efforts will consummate our object sooner or later.

Some years since, I met in Massachusetts, an intelligent gentleman of that State (if I may be allowed to judge of such a character) who appeared to be much interested in farming, and made many inquiries relative to agriculture in Maine. "Ah!" said he, "you run over too much land in Maine; land is too cheap there; the same was true once of Massachusetts, and the defect is not entirely remedied yet." He said his grand-father settled on one hundred and sixty acres of land about forty miles from Boston; he succeeded in his life time in making a valuable farm, kept a good stock, and supposed he was doing all that could be done profitably on a farm of that size. It was subsequently divided between his two sons, each of whom made such improvement that they kept the same amount of stock, and raised as much produce as their father. "And," said he, "my farm consists of forty acres, one-fourth part of the original, and I keep as much stock, and raise as much, as the whole originally did, and I do not believe I have reached its capabilities by considerable, *but I will do it.*"

And in conclusion, I will only add, that in my opinion, a correct system for renovating worn out land, embraces a correct system of general farming; a system which, if correctly followed, will not run out farms. A correct knowledge of the system must be gained by studying what is written, by observing general practice and its effects, and by practicing what experience proves to be correct.

The farmer who rejects scientific agriculture, (or what he terms book-farming) altogether, is like a certain class of physicians who value themselves on account of their ignorance of science, and boast of having derived their skill from an unlettered Indian, and usually

get off a tirade against calomel and the faculty. He who trusts book-farming altogether, and is guided only by the written rule, without variation on account of circumstances, resembles another class of physicians, who never deviate from the written directions on account of different constitutions, or different stages of the disease, but administer the regular doses, at the exact mark of the clock, kill or cure.

The farmer, to be successful, should understand the nature and properties of his soil, the constituents and requirements of the plants, the chemical combination and application of such elements as are suited to the growth and maturity of the same. And in order to attain to this, it is, in my opinion, highly necessary to place the profession of agriculture on a level, at least, with the other professions; and the farmers have only to will this, and it must and will succeed. They have the control of these matters, and have contributed liberally to other professions, and ought now to elevate their own standard to that respectable position attained by others. A geological and agricultural survey of the State, an agricultural college, or school of some kind, that would interest and secure to the profession the highest intellectual capacities, is indispensible to success.

I cannot but hope that the farmers of Maine will give this subject of agricultural education a candid consideration.

Clearing New Land.

By Alfred Cushman, Golden Ridge.

As soon as the leaves attain their full size, which is generally the first week in June, the operation should commence. First, cut every green thing, up to an inch in diameter, with a bush scythe, and everything up to six inches in diameter, with the axe. Then fell the trees as much side the hill as convenient, to ease the rolling of the logs. I think much the best way is, to fell the tops together in winrows about one hundred feet wide. That saves about one-half the labor in limbing, insures a much better burn, burns up much more timber, often a large part of the bodies of the large trees in the middle of the winrows. If they are intended for burning the season they are felled, the limbs and tops should be cut off immedi-

ately; when, if the weather is dry, they will burn well in four or five weeks.

If they are intended for lying over, (which is better than twenty five per cent interest on the outlay,) the limbs may be cut down early the next spring. A very important point in clearing new land, is to secure a good burn, which can be done when well dried, with a good wind. Then different modes are pursued. The one I think best, is to cut all the timber two men can conveniently handle, in pieces fifteen or twenty feet long, and pile them against the large trees, much of which will be consumed in the burning piles. When the piles are burnt down so the brands can be handled, with an old axe or picaroon draw them across the burning logs, wherever it is necessary to cut them off. This is the most cheap and expeditious way the cutting up can be done. If it is intended for piling with oxen or horses, it may be cut long; if by hand, short; and the difference in the two ways, so far as expense is concerned, is small. If there is much hemlock, a team is much more necessary. Land intended for planting may, or may not be cleared clean; the less timber, however, there is left on the land, the better the crops will be. With a good burn on hard wood land, two experienced men will clear an acre per day, so it will do to plant; or clear an acre clean in two days.

Land inclining to moisture, where grew rock maple and birch, should be planted with corn, beans and turnips; and that more dry, where grew hemlock and spruce, should be planted with potatoes. All the ashes of large burnt piles should be spread on the surrounding knolls. On land fully cleared, an average crop would be about thirty bushels of corn, fifteen of beans, three hundred of potatoes or turnips, and on land well hand piled, about two thirds the quantity.

On new land, all kinds of grain flourish abundantly; one, two or three crops may be taken off before sowing grass seed; if three, for the last one the land should be plowed, to smooth the surface and insure a good crop of grass. When properly managed, the yield will be from forty to sixty bushels of oats, buckwheat or barley, or from twenty to thirty five of wheat and rye.

Facilities of Northern Maine for Stock-Growing.

By Elbridge Knight, Fort Fairfield.

[This topic was assigned to Hiram Stevens, who writes me that his engagements were such as to prevent his attending to it, but he had secured a paper on the subject from his townsman, Mr. Knight. Ed.]

I propose to consider, briefly, some of the advantages for stock-growing in the northern part of Maine, as compared with the middle and southern portions of New England.

Nowhere else can the Eastern States boast of a primitive soil equally fertile, if we except, perhaps, the alluvial flats of the Connecticut River. It generally consists of a deep yellow loam, with a pan of loam, clay, and coarse, gravelly, decomposing fragments of rocks, resting upon a stratum of lime-stone. The pan, or sub-soil, if exposed to the atmosphere for a few months, will produce a crop of hay or oats, without the addition of any fertilizer; hence, we may infer that the soil has every necessary ingredient, to render it enduring and almost inexhaustible. As we go south or west from the Aroostook valley, we find more clay and less loam, until we gradually approach the prevailing granite soil of New England. The few stones that are found here, lie mostly upon the surface, or so near it, that they are thrown out by the plough, without interrupting the furrow. Farms are so level and free from stone, that the pasture, which cannot be conveniently ploughed, is an exception, and not the general rule.

We have, then, in the soil, the important advantage of natural depth, that may be increased by sub-soil ploughing to any desirable extent; and the surface may be easily freed from stone, and fitted for the mowing machine and other labor-saving implements, which will lessen the expense of cultivation far beyond what can be done upon the verdant hill-sides of Vermont, or, upon the rocky lands that join the sandy plains which skirt the mighty ocean.

The porous condition of the soil, owing to its small proportion of clay, permits the roots of grass to extend freely in every direction; hence its natural security against drought; its draft for sustenance reaches a larger portion of the soil; and the roots are seldom or never found matted together near the surface, which is commonly called "binding out," and which lessens the crop to such an extent

that it is scarcely worth harvesting until it has been ploughed and again seeded to grass. Here we can suffer the grass to remain, without deterioration, many years, by giving it the necessary food in the form of top-dressing; and experience has shown that our soil and sub-soil absorb and retain manure, so that it does not

"Waste its sweetness on the desert air."

I consider this no small desideratum, for a saving of about fifty per cent. in labor and manure is made, by this mode of cultivation, over the one commonly practiced with the plough. Top-dressing may be denominated nature's own method of distributing fertilizers. The hay crop is also protected against the wet weather of fall and spring, by the porous condition of the soil. It is also more secure against injury from insect tribes than in lower latitudes. I consider the hay crop less liable to injury from these causes, and consequently more certain, than in any other portion of the country.

Red clover, herds grass, and most of the other valuable perennial grasses, are well adapted to our soil, and our climate is well adapted to them, for they are seldom winter killed, unless enough of the crop is left upon the ground to smother the red clover.

The porous state of the soil is a preventive against injury from the late and early freezing of the ground; while in the colder months we are secured from this evil by a covering of snow, that almost wholly prevents frost from entering the ground, and producing the deadly effects so often seen in the pastures and mowing lands of the sea-board. The plants of clover and grass are in a healthy, and even vigorous condition, when the snow leaves the ground. I say vigorous, for, if frost was in the ground when the snow fell, it has disappeared, and the plants have already commenced the growth of the season—a growth that is scarcely checked by cold after the snow disappears in spring. Hence the full development of these plants, and the abundance that greets both man and beast.

As I shall have further occasion to remark upon our climate and its effects upon the stock-growing interests of the region, I will briefly describe our winters as commencing upon an average about the middle of November, by the fall of deep snows, which generally leave the earth's fair face about the middle of April. We can hardly be said to have a spring, for it ceases to be winter, and summer with its verdure has already commenced. By this protection from the

cold, our pastures, like our mowing lands, are found verdant when it disappears, and at this period, young cattle and sheep are turned out to shirk for themselves.

The vigorous condition of our pastures in spring, is continued through the season by the dampness of our climate, and the aid of frequent showers. It should also be known that we are not subject to summer droughts as in other portions of the country.

It is not uncommon for cattle to be taken from our pastures to the shambles; and sheep are frequently slaughtered here weighing one hundred pounds after they are dressed, and having from an inch to an inch and a half of fat upon the ribs. It is no small advantage to have cattle become beef in the pasture, or even to make a near approximation to it. Nor would I here omit the remark that, so even a supply of food is favorable to the quality and quantity of dairy products, and also to the health and vigor of the animal. The long winters, during which our cattle do not graze upon the earth, are also favorable, for they retain their appetite until spring, and are generally in good condition when they leave the barn. In many minds, an impression exists, that our long winter is an evil that cannot be counter-balanced by any existing advantages.

I have already enumerated the advantages of a vigorous forage over a weak, puny, and often times, perishing one. I have also remarked upon the better health and condition of the animal, both summer and winter, as a natural consequence; and I am further prepared to express, most confidently, from actual observation in each of the New England States, the opinion that cattle need forage prepared for them, one year with another, as short a time, upon the Aroostook, as in any portion of these States.

Our winters may be colder, as tested by a thermometer, but they are not as uncomfortable as in more mountainous regions. We have fewer driving storms, less frequent tempests, and almost entire freedom from the cold, damp, chilly winds of spring. We have warm, growing weather in May and June, when the Green and the White Mountains are sending forth their chilly blasts from their snow-capped eminences, to the discomfort of thousands who need, at least, one over coat more than is required in the valley of the Aroostook.

All kinds of English grain are very luxuriant here, which sug-

gests three important considerations in reference to stock-growing; first, an abundant supply of coarse forage to aid in wintering young cattle; secondly, the grain itself, to be used as occasion may require; and thirdly, the advantage of these productions to the fertilizers of the farm.

The friable nature of the soil renders the cultivation of roots easy and profitable. Used with coarse forage, they are of much value in wintering many kinds of stock that would otherwise require hay, and perhaps grain, to keep them in a desirable condition. They are also of much value in furnishing a healthful and desirable change of diet in mid winter. Turnips of various kind are grown here with but little trouble or danger of serious injury from insects. Turnips may be successfully used in fattening cattle for the shambles. I have been more successful with ruta bagas, as a principal food, than with corn itself. One year, I fattened three oxen, giving each (after he became accustomed to the feed,) three sheaves of oats per day, and as many turnips as he would eat, but no water. Each ox gained one inch in girth per week, until he was deemed fit for slaughter.

Before closing, let me call attention to the abundant supply of muck in our bogs and cedar swamps. It is composed mostly of decomposed moss, and from the leaves of ever-green trees, and consequently contains a large amount of acid. It may be neutralized and rendered fit for the soil by an alkali, by exposure to the atmosphere for months, or by being placed in barn-yards, or used freely as a litter for cattle or hogs. By the use of this valuable absorbent and fertilizer, fields may be rendered more and more productive from year to year; and even exhausted lands need not await the slow process of nature to restore their fertility. The cedar swamps are also yielding a sufficiency of fencing timber, so that the farmer may enjoy the advantages of good fences, quiet cattle, and frequent change of pasture.

These advantages are so numerous and prominent, that they have already affected the public mind, and our farmers are rapidly increasing their herds and their flocks, not unmindful of the policy that leads to thrift and wealth. The wealth of New England has been, to a great extent, gathered from her grass-covered hills, by the docile animals that have become subservient to the will of man.

With the success of our fathers as a motive power to urge us forward; with their experience to direct our efforts, and with many superior natural advantages, may we not anticipate, with a confidence bordering upon certainty, a bright future for northern Maine?

The Potato and its Culture.

By E. B. Stackpole, Kenduskeag.

S. L. Goodale, Esq., *Secretary, &c.*

Dear Sir:—Near the close of the last session of the Board of Agriculture, "Potatoes and their Culture" was assigned to me, as the subject upon which I should write; I herewith send you my thoughts on the subject.

The potato, when first obtained from its native mountains, was a small watery tuber, and of but little value as food for man. Since then, by cultivation, it has been brought into so improved a state, that most of the civilized nations of the earth took to it, as one of the most important articles of food. I think it will be conceded by all, that no vegetable has so large a claim upon our attention, as farmers and cultivators of the soil. It has become a common dish upon most of our tables, and is well adapted to meet the wants of the people of this country. The potato grows best on green sward; old pasture land plowed up in the fall of the year, and planted early in the spring, is the best for raising potatoes. Such land appears to furnish, as its turf decomposes, the most natural nourishment for them; it preserves moisture in the soil, and forms a loose mass, in which they form and grow to a large size, and generally of good quality. I think it is not advisable to use fermenting manures in the hill; if such manures do not cause the potato rot, they no doubt are auxiliary to it. Ashes, lime, salt, plaster, coal dust, muck and old tanner's bark, or a compost made of most or all of them, may be used with profit and safety. In Penobscot county, the best varieties raised for the table, are the Jacksons and the White Blue Noses; the best for a crop and a market, is the Orono or Reed potato. The seed—about eight bushels to the acre, of medium sized potatoes—should be put into the ground early, in drills three feet apart, one piece of seed in a place, fifteen inches apart in the drills, and cov-

ered about three inches deep; they should be hoed as soon as they are large enough, and never after they begin to blossom, as late hoeing causes new sets of potatoes on the vines, which prevent the first from growing to a large size, and consequently we have a large number of small, and but few large potatoes at the time of harvesting. When harvested, they should be kept in a *dark* cellar, and as much from the light as possible; if kept in the light, the flavor becomes impaired; much more so than when buried in the earth, or kept in a dry, dark cellar.

The rot, for the last fifteen years, has destroyed nearly one half of the crop in this vicinity, and attempts have been made, here and elsewhere, to discover the cause, and to find a remedy. The disease has been investigated in almost every form and shape, but the labor has been lost; for we know no more about it to day, than we did ten years ago. With all the theories respecting potato rot, we are yet as much in the dark as ever. Potatoes deep in the ground do not rot as much as those near the surface; of different varieties planted side by side, some will rot and others will not; some kinds rot one year and others the year after—no two fields of the same kind of potatoes produce the same results.

Corn and its Cultivation.

By Hiram Russ, Farmington.

As upon this subject there are various opinions—different soils requiring different treatment—and as there are others who differ from me on the subject, I will confine my remarks to the culture of corn on the intervales bordering on the Sandy River. Until a few years since, our farmers plowed their green manure in very deep; of late we find this mode of cultivation wrong; by keeping the dressing near the surface, we find our crops to be much better, and our ground holds out for grass equally as long. Our manner of cultivation now is to plow six to seven inches deep, sow to oats the first year, plow in the fall again, in order to kill the witch or twitch grass, so called; haul on the green dressing in the spring; spread it broadcast—some work it in shoal with a light plow, most of the farmers use the cultivator or horse-hoe—then furrow out the rows three feet apart;

chain off the rows three feet the other way, putting one shovelful of old, rotten barnyard, hog or compost dressing in each hill; drop about six kernels in each hill. I find on our back or highlands which are moist or wet, they spread their dressing, turn two furrows together, and plant on top of these furrows.

My own manner of cultivation is, in the first year, to plow five or six inches deep and sow to oats; the next fall plow nine inches, or three or four inches deeper than when broke up—this I call subsoiling; next spring, plow three to four inches—this lightens the soil; then spread on my coarse or green dressing, working it in well with a horse-hoe and harrow; plant my rows three feet each way, with a shovelful of old manure in each hill; use the Dutton corn mostly.

Some plant in ground broke up in the spring, treated in the same way as old ground. I consider this last method the best, if it was not for the worms—they are apt to get more than their share.

SWINE.

By W. M. Palmer, Palmyra.

I enter upon this subject, which has been assigned me, with some diffidence and reluctance, both by reason of its nature as well as by the want of statistics necessary to present it in a proper light to the public. I am very well aware that the subject does not present that field for the display of learning and research, or one that is likely to excite the enthusiasm of the writer of genius, that many other topics might; though we read that ancient Rome was built upon the prophetic site made known to the Trojan hero, by a "sow reclining upon the ground surrounded by a litter of thirty white pigs."

Whatever, then, in general, may be the political influence of swine, whatever connection in the minds of statesmen they may have with government, this is most certain, that they form a large part of the bone and muscle—"the sinews of war" of our country, and especially of the people of Maine. I desire, therefore to call the attention of the public to this department of husbandry, which by reason of its connection with the best interests of the farm, is one of the greatest importance, and yet it is one which seems to be neg-

lected to an extent beyond what a reasonably enterprising spirit among our farmers would seem to warrant.

Our State, which is essentially an agricultural one, annually consumes many thousand dollars' worth of western pork, which it must be conceded by all, is less healthy than that of domestic growth. Now, since we labor under many disadvantages in respect to some agricultural products, we ought to make the best use of our facilities for rearing domestic animals, to which our climate is well adapted.

I know of no difficulties or obstacles in the rearing of swine, that should prevent our supplying at least home consumption, thus annually saving to the State, a large amount of money, which could be successfully employed as capital, in other departments of industry, but which now adds to the wealth of other States. We are able to raise all that is necessary to fatten swine, and there is as little or less risk attending them than other domestic animals. In order to show that the usual prices of pork are sufficiently remunerative to make the raising of it profitable, I will add a statement of facts which came under my own observation, which is far from being as favorable to my object as in ordinary cases it should, since the farmer should raise his own pigs and corn.

A hired sixty dollars; with twenty dollars he purchased eight pigs; the remaining forty dollars he expended in corn. He afterwards disposed of four pigs, and expended the proceeds in corn. The remaining four yielded him one thousand pounds of pork, which he sold for eight cents per pound, thus netting him $16.46. And in addition to this he made manure sufficient for one acre of corn.

8 pigs, $2.50 each,	$20 00	1,000 lbs. pork at 8c.,	$80 00
Corn, . .	40 00	Cost, . .	63 60
Interest on $60, .	3 60		
	$63 60	Net profit, . .	$16 40

In this statement, I have taken it for granted, that the manure would be amply sufficient, to pay for the labor. But the profits are not confined exclusively to the sales of pork. Swine seem to be a natural accompaniment to the dairy; and true economy would demand of the farmer that the number of swine should bear a due proportion to the number of cows; otherwise he cannot

realize the full reward of his labor, nor in any other way so speedily and easily convert into ready money, the coarse products of the soil. Raising swine, in comparison with other animals, as neat stock, and horses, has this advantage. In the case of cattle and horses, it requires five or six years before they will bring their highest price; but in the case of swine only one and a half years are necessary to bring them to maturity. But this is not the only advantage of rearing swine, in comparison with other animals, or the only use they may subserve the farm. It must be admitted that the true policy of the farmer is to increase the richness and fertility of his acres, by restoring to the soil as much or more than he takes from it. It is a well known fact, that farms in many parts of the State are "running out," as it is termed. The soil, without being replenished by proper fertilizers, at last refuses to yield its increase; and it must be reclaimed or be abandoned as useless. In reclaiming these worn out acres, swine are able to perform an important part.

The uneven surface of the soil causes it to be constantly washed by rains and dissolving snows, carrying each year some part of its virtue to lowlands, bogs and swamps; and this process having been going on for ages, the result is that we have vast deposits of muck accessible to almost every farm—the dormant wealth of the soil of our State. What then more natural, than to suppose that these deposits were intended by nature for the renovation of exhausted fields? But this muck needs to be manufactured, as it were, and no animal will perform this duty so effectually as the hog, which, ever living up to his motto, "root hog or die." with grunting contentment, pursues his daily vocation of dissecting and digesting this black vegetable muck. A few days' work of the farmer with his team, each year, would supply his hogs with material sufficient to manufacture many cords of the best manure. With this little amount of labor and enterprise, the farmer in moderate circumstances, in a few years, would behold his renovated fields bending under their harvest loads; joys would fill his heart and gratitude his soul, instead of that sadness and discontent, which the daily sight of unfruitful fields cannot fail to produce. It is in this way only, that the farmer can restore to his land the richness which nature so long has been gradually removing—a work on which his lorship "hog," must "have his nose."

Hoping that what I have so imperfectly written on the subject, may arrest the attention of the reader, and suggest to him the propriety of trying an experiment which can do him no harm, but one which will certainly enrich his farm and put money in his pocket, I have the honor to be, &c.

Planting of Orchards.

By Joseph Avery, Jefferson.

The planting of orchards should claim the attention of every one that intends to cultivate the soil for a living, and it should be his first business to select a suitable piece of ground for that purpose, which should be dry upland soil, as the apple tree seldom thrives much on cold, wet soil. What is known as good corn land will serve well. It should then be made sufficiently rich and mellow, that the trees, when transplanted, may take root and grow. In the selection of trees, let them be from nurseries in this State, of the same kind of soil as that into which they are to be transplanted. They should be taken up in such a manner as not to injure the main roots; then by digging a place sufficiently large, and the earth loosened to a suitable depth, so that the roots of the tree when set may lie in the same position as they grew originally, without being forced, and as nearly as possible to the same depth in the ground. The care taken in setting trees, has much to do with their future growth. The trees should be set from twenty to twenty-five feet apart, in straight lines, for uniform appearance, and the better to cultivate among them. After being planted, they need care and training to give them proper shape. To till the orchard by root-crops is beneficial, also mulching in the fall with chip manure, to retain the frost, and to prevent the sap starting too early in the spring.

On many farms, there is rocky, broken land, not suitable for tillage, but more suitable for pasture, which may be set with apple trees to advantage, care being taken to select those trees whose tops may attain sufficient hight to be beyond the reach of cattle, and when they grow to afford shade and fruit; they attract cattle, sheep, and hogs under and around them, which manure them sufficiently. And such trees are found to come forward nearly as fast, and to

bear fruit as well, as those in cultivated orchards. The objection, that the fruit that falls before time to gather is lost, is not of much force, for it is eagerly sought by almost every creature on the farm, and does them good, besides which, this method secures the destruction of the eggs and larvæ of injurious insects (like the apple-worm, which is in many places a great pest,) which may be contained in the premature fruit which falls early, and thus prevents their propagation.

The planting of apple trees by the fences in fields near the roads, is found profitable, on account of the fruit as well as the shade they afford. The increasing demand for apples for export, as well as for home consumption, at the prices paid for them, gives a profit to the grower, and no labor or money invested in farming pays a better profit than that invested in orcharding, if applied in a judicious manner.

On the Renovation of Old Orchards.

By N. T. True, M. D., Bethel.

Their condition in Maine. By an old orchard is usually meant, one that has not been grafted, and which has, in other respects, been neglected for a series of years. It is on this class of trees that I shall more particularly treat in this essay. Such trees are usually sadly in need of manuring, trimming, and grafting. Many, very many such orchards, exist all over the State.

Preparing the soil and Manuring. If an orchard has, in years past, been plowed, it is better to spread on a coat of animal and vegetable manures, and plow them in. These may be used in generous quantities. Be quite as anxious to manure the trees at a distance, as near the trunks. The object is to give a new start to the woody growth. Mineral manures, such as lime, plaster, and ashes, should, as a general thing, be reserved till the trees are ready to bear. Cultivate the land the first year with potatoes, if convenient. By this means, the earth becomes porous, and new roots will extend throughout the soil. Muck, well prepared, coarse straw manure, as well as chip and stable manures, are all excellent for this purpose, and well adapted to the growth of the woody fibre.

Pruning. Much has been written in regard to the season of the year for pruning. I do not regard it of so much consequence *when* it is done, as *how* it is done. Theoretically, the best time is after the trees have commenced to set their fruit in June until October. The wounds are not so likely to bleed, and will heal over and leave the wood sound beneath. The early spring months are usually the most convenient for this purpose, and I never could perceive any injury to the tree; but it is absolutely necessary that the wounds be covered with a coat of paint. Red ochre and linseed oil mixed together quite thick, and put on rather liberally with a brush, is as cheap and as good as anything.

Be sparing of your trimming the first year, cut out limbs absolutely dead, and be sure to cut them as near to the trunk as possible, especially on the lower side of the limb. Have an eye constantly to the limbs suitable for grafting the next year. Take out small limbs that cross each other, so as to have your tree shaped nearly like a spread umbrella inverted. Trees that have a sickly look, or whose main branches are dead, or whose bark is dead over half of its body, should, as a general thing, be cut down, and their places supplied with young trees. In ten years you will have a healthy young tree just into bearing, while the old one, with all your care, will be an old, sickly-looking tree still, and non productive. A tree may be hollow, and yet be a suitable tree to graft. Do not trust to a sprout from an old tree. It rarely ever amounts to anything. Dig out the whole tree, and spread on a load of manure, and cultivate one year before you put another tree in its place. Without this, a tree will not succeed well in the place of another. Sometimes an old tree may be delayed for several years before it is grafted. The extremities of the large limbs may be cut off and painted, and new shoots be suffered to spring out, which may be grafted and make a fine tree. In no case trim your trees so as to expose the naked limbs to the hot sun. If you do, the bark will be killed the whole length of the limb, and frequently be the cause of death to the tree.

Trees that are covered with moss should be scraped and washed with a weak solution of lime, potash, or soda, *weak*, I say, because many trees have been killed by too strong an application of these substances.

Grafting. This may be commenced the second year after manuring. I wish to be understood that renovating an orchard, is a work of time. With proper care, it may soon yield a return on the money invested. So grafting should not be commenced till the woody growth of the tree has been revived by the treatment of the previous year. The scions will not then become dwarfed, but will at once commence a healthy and vigorous growth. Do not graft too long limbs. They rarely ever do well. Those from one to one and a half inch in diameter, are large enough for this purpose. Trim as little as possible this year. The habit of docking the whole top of a tree is apt to be fatal. All the limbs in a tree suitable for grafting, may be grafted the first year, provided there is a large number of under-branches and twigs on the limbs. See that you make use of vigorous scions of the last year's growth. Make use of vigorous kinds of trees to graft into those of an unhealthy aspect. The Baldwin is excellent for this purpose. Slow growing varieties should never be grafted into such trees. The earlier in the season you graft an old tree, the more likely it will be to succeed. It only wants a warm day in March or April, even when the snow is on the ground, if the wood is sufficiently warm for the wax to adhere to the bark. If the wood is too cold, or wet, it cracks off and destroys your graft. I practice shouldering my scions, with much success. I obtain a better fit to the cleft than by a wedge. In plum trees I use it altogether. It takes a little more time, but everything about grafting, pays well to have it done in the best possible manner. Be exceedingly careful to press the wax closely to the wood on the end of the stock, and around the scion. Many fail, from a neglect of this precaution. Make your wax a little softer than is usually prescribed in the books. It will be better in this climate. One part linseed oil, two parts bees-wax, and four parts rosin, is a very good proportion. Simmer together in an iron kettle, and pour it into a tub of cold water and work it like shoemaker's wax, or molasses candy. If it is too soft, use more rosin; if too hard, more oil. You can test it by dropping a little into cold water and working it.

After you have finished grafting for the season, go round with your paint pot and cover every wound, large and small, with paint. Sometimes, a very small twig will bleed so as to blacken the whole limb below. This is frequently the case with young trees, and

retards their growth or destroys them. Paint over when necessary the wounds of the preceding year's pruning.

During the summer, it is well to go round and close up the cracks in the wax, occasioned by the expansion of the wood.

See that the ground is well tilled the second year, but be careful not to plough so deep as to cut off large and important roots. This is not necessary. Keep the grass and sprouts away from the trunks, watch carefully for the borer, and you will need to pay but little more attention to your orchard for the second year.

Pruning the second year after grafting. More orchards are killed during this period of their renovation, than at any other. It should be very sparingly done. It is a great temptation after you see the scions well started, to trim off all the under-branches of the limb. But here lies your greatest danger. The leaves are the lungs of trees, and what few there are on the scion cannot take the place of all the branches, and elaborate all the sap in the limb. Congestion takes place, and the limb dies. Cut out such limbs as may interfere with the growth of the scion. Re-graft and fill out such stocks as may not have taken the previous year, observing to wax over all the scions of the last year where it is started off. A limb may often be saved by a little attention to this, especially where but one scion took the year previous. Follow up with your paint pot as on the previous years.

The third year. The operations of this year will be but a repetition of the previous year. Cut out a few more branches. Now and then the scions may have grown so large that the feeblest scion in the stock may be cut out, and the other so shaped as to form the future top of the tree. If two scions are left for several years, they out-grow the stock. When large branches have been cut, and new wood is forming over the wound, you can frequently assist nature by taking a chisel or a gouge, and a mallet, and cut out the old wood so as to give the new wood a better opportunity to turn in and cover the wound.

If you have had tolerable success, you will now begin to enjoy real pleasure in what you have done. Your Baldwins will begin to bear, the third and fourth years after grafting, and continue to bear more or less every year till they become well topped, when they will bear every other year. Your Blue Pearmains will not begin

to bear till several years later. The Hubbardston, Nonsuch, and Yellow Bell Flower, will also come into bearing very early. Your early varieties, and sweet apples, should be grafted near the buildings where they will be less exposed to plunder.

By careful attention a few days each year, an orchard may soon be made very productive and profitable. There are many orchards in this State that might be made as profitable as all the rest of the farm, which are now valueless. The orchardist should not be discouraged if a tree dies. Set another in its place. Change is stamped on everything, and apple trees are no exception.

You can now spread on a coating of lime, plaster and ashes, which will assist in the formation of the fruit.

With a very little attention from year to year, you may have an abundance of fruit, and anticipate an annual return (and a year soon rolls round,) for your investment. We mark a man's thrift quite as readily by the conspicuous appearance of his orchard as by anything else on his farm.

Loss Arising from a Surplus of Horses.

By Seward Dill, Phillips.

S. L. Goodale, Esq., *Secretary, &c.*

Dear Sir:—I have to acknowledge myself tardy in furnishing you, as requested by the Board, a report upon the topic above named. The work has proved itself a larger and more difficult one than I anticipated. Sometime ago, I wrote to the assessors of nearly all the towns and plantations in my county, and made verbal inquiries in the others, in order to obtain the statistics necessary to build upon. Answers have come to hand from four towns only, namely, Phillips, Madrid, Strong and Wilton. In justice to Weld, I will say that her officers were prompt to answer my call; but by a misfortune the answer was lost, so that it could not be brought into the reckoning. From the statistics of these four towns, I could do no better than to draw an estimate for the whole county.

Phillips, according to the inventory of last April, has four hundred and seven horses and colts, taking no account of any under a year old; Madrid has eighty-three horses and colts; Strong has

one hundred and eighty-five; Wilton has three hundred and ninety-four. The number in the four towns is 1,069. There are in the same towns, as shown by the returns of the last State election, one thousand and eleven voters. In the whole county, there are, by the same returns, four thousand two hundred and seventy-nine voters. Then as the voters in the four towns (1011) are to those in the county, (4,279,) so, we may assume, are the horses in the four towns (1069) to the number in the county—making this number about four thousand five hundred.

One half of these, (2,250,) I allow to be required to do the legitimate horse work of the county; one third of the remaining half, (750,) are in my proving, usurpers of the places which would be more adequately filled by oxen. The other two thirds of the remaining half, being one third of the whole, (1,500,) I put down as an absolute surplus—so much amount of dead capital.

These fifteen hundred horses, (nearly two thirds are horses, the other third being colts one year old and upwards,) I price at an average of fifty dollars each, giving a non-producing capital of seventy-five thousand dollars. The loss in interest on this capital, is four thousand five hundred dollars per annum. The yearly cost of keeping one horse, I reckon to be twenty dollars, making the annual loss in keeping, upon the whole number, thirty thousand dollars. The annual loss in shoeing upon the same, (allowing that one half need to be kept shod, and that three dollars will meet the yearly expense of shoeing one horse,) is two thousand two hundred and fifty dollars.

Supposing that only one third of this surplus number (500) are fitted out with their proper traveling gear, including harness, wagon and sleigh, their owners are subjected to an expense of about fifty thousand dollars to furnish the fittings, the fitting of each horse being valued at one hundred dollars, (harness fifteen dollars, wagon sixty dollars, sleigh twenty-five dollars.) These fittings would last not longer than ten years; so that the annual loss in wear and tear of traveling gear, brought upon the county by its surplus of horses, is five thousand dollars. Each of the same five hundred horses, thus geared for travel, will take for its owner, at least two holidays a month—days spent by himself or his "fast young men," in riding for pleasure, going to the village, &c., &c., which otherwise would

be passed in profitable labor upon the farm. Two holidays a month, would be twenty-four a year for each horse, and twelve thousand a year for the five hundred horses. Reckoning a dollar for each day, the annual loss to the county for time wasted by its surplus number of horses, is twelve thousand dollars. The sum of these items is fifty-three thousand seven hundred and fifty dollars, which is all absolute loss. But there is relative loss as well, two items of which I proceed to indicate.

The capital vested in those fifteen hundred surplus horses, valueing them as above, at fifty dollars apiece, is seventy-five thousand dollars. Let this be laid out in cows at twenty-five dollars each, and we have three thousand in number. Each of these cows will bring to her owner, a net income of eight dollars per annum, making an annual income brought by the whole of twenty-four thousand dollars, and showing the same amount as an annual relative loss to the county from surplus of horses.

The other item comes from the fact, as stated above, that one sixth of all the horses (750) are kept to do the service which would be better done by oxen. Mr. N. Foster of Gardiner, in his essay on the comparative value of horses and oxen for farm labor, (see "Agriculture of Maine," for 1857, page 92,) estimates the difference in value of a pair of oxen against that of a pair of horses, to be for twenty-four years, eleven hundred and eighty-three dollars. This would be about fifty dollars for one year. Then for the seven hundred and fifty horses—being three hundred and seventy-five pairs—the difference in favor of ox labor would be, eighteen thousand seven hundred and fifty dollars, which is the amount of relative loss to the county from surplus of horses.

The two items together, amount to forty-two thousand seven hundred and fifty dollars—relative loss.

Adding to this the sums before obtained, fifty-three thousand seven hundred and fifty dollars—absolute loss; and we have an absolute and relative loss of ninety-six thousand five hundred dollars.

I suppose it to be not exactly an indispensable part of my work, either to go into any general remarks, or to take much pains in citing individual cases bearing upon my topic. Nevertheless, I venture to say, that it might not be very hard to find upon the field of my

survey, instances of extreme hardship and suffering endured by wives and helpless children, fairly chargable to this mania for keeping useless horses, sufficient to move deeply the sympathies of any philanthropist, and one would think sufficient to reform the practice of any horse worshipper not thoroughly brutalized.

These surplus horses are often very convenient—at any rate easily available—conveyances to take their riders into the haunts of rum and revelry. They frequently, in winter, are forced to stand shivering and starving out of doors, while the riders are burning their lives out within. I will name a single instance of the kind, which came within my knowledge, last winter. It happened in this county, not many miles from this town: Six horses owned by one man or one family—rather, *kept*—for it is quite common for the horses in one man's possession to be mortgaged to another—died from habitual exposure to the chilling winter weather, hard driving, and lack of food, on occasions such as I have alluded to.

The Soiling System.

By Calvin Chamberlain, Foxcroft.

S. L Goodale, Esq., *Secretary, &c.*

Dear Sir:—You having wisely devoted considerable space in your report to the subject of *stock husbandry* as a leading pursuit in the State, and understanding, as I do, that *the grasses* and *the hay crop* is to be the prominent topic of the volume you may now have in hand, it seems to me a proper time to direct the attention of your readers to the important subject of *soiling*.

This is a comprehensive term that comes to us from the old countries of Europe; and means the keeping of cattle in stables and yards, all the year, with only a daily or an occasional liberty to ramble over small enclosures, as circumstances may admit.

This mode of keeping cattle has long been pursued in Germany, France, and other continental countries, and was thence introduced into England, where it has obtained very general adoption, and with profitable results. Many thorough and intelligent farmers of our own country are now practicing it on an extensive scale, with great and decided advantages.

Our farmers and cattle owners may urge that the climate and soil of Maine, the value of lands, and so forth, preclude the adoption of a system so radically differing from our prevailing mode, however plausible it may appear from data drawn from the customs adopted by the force of circumstances, in the densely peopled countries of Europe. It is my purpose to furnish for your use, a few pages, in which I shall aim to present this subject fairly, and as fully as my limited time and the opportunities at hand may allow. The facts and the reasonings of farmers of this country, and in Europe, will be presented in brief, with the hope that they may attract attention, and lead many to adopt this mode, fully or partially, at once.

I have some personal experience in this matter. For the last eight years, I have, as a farmer, occupied but a few acres, unproductive at first,—and have kept two cows and a horse, and for a part of the time, three cows and two horses; and during the whole of this time, my cattle have not for a single week obtained their full living by pasturage; and for the most part of each summer, but a small portion of it.

Having thus partially adopted the *soiling system* in my own practice, I have been led to examine and inquire into its practical workings elsewhere. What I have here accomplished, on the soil, and under the climate of Maine, is to me reliable data for future operations, and has enabled me to draw just conclusions, touching the theory and practice of those whose operations have been laid open to the public.

The system, like the progress of abiding truth, has, almost silently, for a long time, been working its way into favor in many localities over our extended country. In the valley of the Connecticut, and some other rivers, it is much practiced, from the circumstance that the broad intervales are annually denuded of all fences by the floods.

The advocates of soiling, claim to have established the truth of these six propositions:

1st. The saving of land.
2d. The saving of fencing.
3d. The economising of food.
4th. The better condition and greater comfort of the cattle.
5th. The greater product of milk.
6th. The attainment of manure.

To offset these advantages, we have the labor of raising and cutting the food, and the feeding and care of the stock.*

1st. *The saving of land.* This is a fact established by concurrent testimony everywhere. To what extent this saving has been carried, we will show by introducing a few witnesses. Quincy says: "European writers assert that the saving which results, is as one to three; others say, as one to seven. Others still, that the saving is yet greater; that is, one acre kept for soiling, will go as far as three or seven, or more, kept for pasture, in the support of stock. On farms where the whole soil is capable of being plowed, the economy of soiling is great.

It may be, however, useful to observe that the reason for the diversity of statement, in relation to the degree of saving, results from the different ways in which the land used for soiling is cultivated for the purpose of raising food. Some satisfy themselves with enriching the former pasture, and cutting the grass it produces, for the soiling use. Others plow up the pasture; raise cabbages, or other succulent food, on which they support their stock. Now it is plain, the result of a comparison of saving of land made between an acre of enriched pasture, and an acre appropriated to the latter of these modes of husbandry, must be very different. In either case, the economy is sufficiently great."

The maximum product of an acre of land has nowhere yet been determined. The amounts obtained, often surprise us.

From the reports of a committee of the British Parliament, showing the condition of small farmers, we find much of interest in the results from exact and high cultivation, and much that bears directly on the above proposition.

In one case, of a man who held an allotment of four acres; in one year, he obtained forty-two bushels of wheat, two hundred and fifty bushels of potatoes, and ten bushels of barley; and kept two cows

* In my search for reading, I found a small volume of Essays from the pen of the Hon. Josiah Quincy, of Boston, published the present year, in which he has clearly summed up the principal facts and reasonings of European farmers, and detailed his own experience in a practice of the system for twenty years; keeping, a part of the time, from thirty to thirty-five milk cows. I am under great obligation to the venerable author, in behalf of the farmers of Maine, for such extracts from his Essays as I have adopted, as being better adapted to our condition and wants than anything I have found written elsewhere. C. C.

and four pigs. The cows were kept entirely on the products of the four acres. A portion of this was not arable, as some trees were growing upon it.

An inquiry was made of the occupant of a small allotment, "how it was possible to keep two cows, and maintain a family of five persons, on only three acres of land." He answered, "The statement you saw was very true: half an acre of pasture, half an acre and eight rods in wheat, and one quarter of an acre in oats; the other part was green food for the cows; such as rye, tares, cabbages, clover, mangolds, turnips and Italian ryegrass." Then follows in minute detail, the mode of culture; and he then says, "I hope it now appears how the cows are maintained in winter as well as in summer. During last winter, I had no hay; only turnips, mangolds, and straw; and they did very well."

This is a pretty strong case; where it is shown that two cows were kept the whole year on the produce of eight rods less than one and three fourths acres of land, with only the addition of a half acre of pasture, and the straw from four fifths of an acre of grain, abating the vegetables consumed from the same land, by a family of five persons.

In a communication to the British Board of Agriculture, it is stated that thirty cows, one bull, four calves and five horses, were fed through the summer, from fifteen acres of clover, sown the preceding year. The labor of four persons was sufficient to tend them; and the net produce of the season, in butter, from June to October, was £19.10s.—over ninety-five dollars per cow. Forty animals to fifteen acres, gives sixty square rods (three eighths of an acre) to each. Sixty square rods in clover producing a net income of over ninety-five dollars!

On this point, Quincy writes, "It is now six years since I commenced the soiling system; and no consideration would induce me to abandon it. Every year brings new convictions of its facility and its productiveness. If farmers would be persuaded to commence the system upon a small scale, with one or two head of cattle, they would gradually become acquainted with it; success would inspire confidence, until, enlarging the number of cattle soiled, they might, in time, easily keep one head per year, for every acre of land they possess. Greater than this would be the ultimate result of the system, if wisely conducted."

After twelve years experience with the system, Mr Quincy writes, "From my own experience, I do not hesitate to state that three cows may be kept during the summer season, in full milk and in high condition, on a single acre."

From an account of the inspection of farms by the St. Quivox Club, Ayrshire, Scotland, we read: "About fourteen years ago, Mr. Ralston sowed a five acre field with a variety of meadow grasses, and laid down the land in the proper form for irrigation with the liquid manure of the farm-yard diluted with water, of which he has a sufficient supply. It has been done at a small cost, and has paid extremely well. In good years, he has taken as much as sixty tons of grass from an acre of land; and during the present season, the field has kept thirty cattle and sixteen horses since the third of May." This account was dated August 7th. This field may have been reckoned as Scotch acres, which are somewhat larger than ours.

Adam Anthony of North Providence, R. I., entered upon a farm in 1826, of the extent of seventy-two acres, suitable for tillage. The land was very sandy; and the crops of that year were five tons of hay, two tons of oats, two hundred bushels of potatoes, two hundred of turnips, some fruit and garden vegetables; worth, including pasture feed, three hundred eighty-five dollars. He adopted the soiling system. In 1847, he reports the produce of the farm as two hundred tons, by estimate, of green fodder for soiling, one hundred tons of hay, twenty-five tons of millet, seventeen tons of dry corn fodder, six hundred forty bushels of potatoes, seven hundred fifty bushels of Indian corn, fruit and garden vegetables, the value of which, is three thousand five hundred seventy-five dollars; nearly ten fold increase in the products of the farm. The stock consists of about forty head, of which thirty-six are usually cows.

Similar testimony might be very much extended, but it is unnecessary. My own experience corroborates the usual statements to be met with on this point.

2d. *The saving of fencing.* The present American system of farming involves a prodigious expenditure of human energy for fencing. I have seen it estimated that the cost of fences in these United States is more than six hundred millions of dollars, (600,000,000.) Whether more or less than this enormous sum, it is so much invested in human toil, a large portion of which might have been saved and

applied to better and more ennobling purposes, had our early system of customs and laws been what they ultimately must be.

It has been estimated from well considered data, that the labor involved in fencing in some of the States, is greater than that in the erection of all the buildings, including all the cities and towns.

Having worked as boy and man, in helping clear and fence a farm, till the aggregate of its fences of wood and stone, extended to six or seven miles, I may be allowed to speak *feelingly* regarding this incubus on the farmer's prosperity.

One-half of all farm fences are *interior;* and aside from an occasional necessity for making a permanent distinction between arable land and a piece that nature designed for a pasture, they are worse than useless.

Adopt a single principle, that no beast shall be permitted to range on lands adapted to the plow and the scythe, and you are prepared to wipe off from the face of our fair country, much that disfigures it, and abolish, at once and forever, a vast item in your annual taxation.

The most false of anything that assumes the name of *economy*, is the practice of pasturing mowing-lands. Interior fences, that were erected, and are maintained for the sole purpose of enabling the proprietor to pasture his mowing-lands, have cost the farmers of Maine a very large sum. To call in the aid of arithmetic, it will read in this wise: The improved lands in the State may now be set down at two and a half millions of acres, (2,500,000.) Taking the estimate by very good authority,* of ten rods of fence, at one dollar per rod, for each acre of improved land, gives us for fences in the State, the sum of twenty-five millions of dollars ($25,000,000.) Half of this sum, $12,500,000, we will set down for interior fences on farms. It may be fair to assume for annual erections, while the present system continues, for changes and repairs, ten per cent of this sum, or one million two hundred and fifty thousand dollars, ($1,250,000) which the farmers of the State are annually paying as a direct tax on their resources, and on which very few have heretofore had the courage to raise their voices in complaint. Impressed with the truthfulness of such estimates, who can for another year remain

* Cumberland Co. Agl. Society. Committee on Farms.

quiet, and see a system of husdandry continued, so blighting to the general prosperity?

By the last census, we find that the whole number of our domestic animals of all ages, reducing the number of sheep by a fair standard of comparison, to neat stock and horses, is to the improved land in the State, as one animal to *four and three-fourths acres.*

No wonder it is hard to devise ways and means to discharge public and private indebtedness. No wonder that our taxes are felt to be onerous. No wonder we have no agricultural schools. No wonder at all that farms are cheap in Maine! Besides the direct expense of erecting and supporting interior fences, they offend by harboring all sorts of vermin. They protect a rare assemblage of brush and noxious weeds, or cost the farmer much labor to have it otherwise. They occupy, with the necessary head-lands left in plowing, much space on the farm, and it is all worse than lost.

Then the loss, in time, in the extra turnings of the team in small enclosures, in using the plow, the harrow, cultivator, roller, mowing-machine, and horse-rake, is no inconsiderable item in the season's operations. I really believe that the plowing done in this State, with our heavy teams and prodigious plows, will show an average length of furrows not exceeding twenty-five rods. In this country of deep snows, our fences often cause immense drifts, which remain late in the spring, keeping the ground wet, and greatly retarding our operations. But we will hasten to leave so unpleasant a theme, for proposition

3d. *The economy of food.* This implies but little more than the first. The differences in areas required by the two systems, arise in part from superior culture in the one case, and in the other, from the fact that much food is destroyed by being trampled under foot, by being dunged upon by the cattle lying upon it and breathing upon it so as to cause it to be rejected. Another reason for these great differences, is, that the conditions of growth, with all the grasses, do not fully exist on soils continuously compressed by the tread of animals. Who has not observed the vast difference in the thickness of sod between lands long depastured, and those mown?

Grasses, as well as other crops of the farm, have their growth in an accelerating ratio. As the size of the plant increases, presenting itself more to atmospheric influence, the faster it draws from that

inexhaustible store-house, in carbonic acid and other gases that contribute to build up its structure; the growth of the roots keeping pace with that of the stalk and leaves. Cattle will eat without waste in the stall, grasses of luxuriant growth that they would reject in the pasture.

4th. *The better condition and greater comfort of the cattle.* Quincy says, "The condition of cattle will always depend chiefly upon the quantity and the quality of the food, and regularity of their supply. In all these respects, feeding in the stall has the advantage of pasturing, because, in stall-feeding, all are under the guidance of intelligence and discretion, and nothing is left to accident; whereas, in pasturing, the beasts are left to their own care. When the pastures are good, and there is a great surplus of food upon them, the difference is not, in this respect, great; but as soon as the pastures become affected by drought, the difference is always perceptible. Farmers who pasture their cattle, seldom, if ever, provide a supply of succulent food, to be in readiness in case of any accidental deficiency of pasture. Now, as every farmer, where he is able, does and ought to stock his pastures up to their full pasture-power, it follows that even a small drought will affect the condition of the animal something, and a severe one very sensibly; a fact of which every man may convince himself by observing cattle at pasture in dry seasons. Now, one great benefit resulting from stall-feeding is, that it makes the condition of cattle, in as great a degree as possible, independent of variations of the season; and although an absolute independence is impossible, yet it is always much greater in stall-feeding than it can be in any mode of pasturing.

Their greater comfort in this mode of keeping, is one of the essential causes of their better condition. During the heat of the day, they are kept under cover in the shade, secure from flies, from being worried by dogs or one another, from eating any noxious vegetables, and from bad water."

It should also be observed, that they are then removed from the ill effects of sudden changes of weather.

In Europe, large numbers of cattle, bred expressly for beef, are kept wholly by soiling. I have before me, some prize essays, published in the transactions of the Highland and Agricultural Society of Scotland; giving in minute detail, the course of procedure to de-

termine the relative advantages of growing beef, by soiling, and by pasturage. These essays are of considerable length, and hardly admissible here for that reason; and they are too minute, perhaps, for a region where men run as they read, and conduct an experiment by guessing. The results of several experiments, show in each case, a marked advantage in favor of the cattle confined to the stall or yards, in superior growth and fatness. It is remarked in this country, that cows long soiled, are in condition to be easily and cheaply converted to good beef. One of my cows, by reason of age, was slaughtered in December last, two weeks after being dried, yielding seventy pounds of tallow; and the beef passed in the market as a very nice article.

5th. *Greater product of milk.* There has been a prevailing impression among farmers, that, although the condition of the animal may be better, yet that the tendency of the food to milk is not so great as when they are permitted to range in pastures. Such an impression has no facts for a basis.

A gentleman in Ulster County, N. Y., well known as an extensive and successful farmer,—R. L. Pell—has practiced soiling his large stock of cows, oxen, horses and hogs. In relation to the quantity of milk, he writes, "I have found, by actual experiment, that cows, when fed in the yard at regular periods, with a change of food, not allowing them at any time to be over-fed, and supplied at all times with an abundance of water, have doubled their milk; that is to say, the same cows that were one year depastured gave, when confined, twice the quantity of milk, and of a much richer quality."

Mr. Anthony, of R. I., says, "Ordinary keeping is not calculated to develope the milking properties of cows. Those that I have purchased, have rarely given more than two-thirds the quantity of milk the first, as in subsequent seasons, the feed in both cases being the same."

In England, two cows, kept on a small allotment of land, in nine and a half months made four hundred pounds of butter. One cow was stall-fed all the year, and yielded a third more than the other, which had the grazing of half an acre.

I have before me a multitude of opinions, based on trial and observation, but will only add here, briefly, my own experience. The cows that I have partially soiled, beginning with the summer of

1852, were of the common breed of this part of the State; one three years old—of rather small size, short legs, and compactly built; the other five years old—tall, gaunt, high mettled, not easily approached by a stranger, ready charged to kick over the pail and the milker; brought a large calf each year, but would go dry four or five months to do it. This was just the cow that I should not have selected to retain when selling off my former herd. She was left on my hands by a mere accident.

Neither of these animals possessed any points of excellence, that I could discover, to distinguish them from the ordinary cows of the neighborhood. Under the treatment they have received, the amount and quality of their milk has been so satisfactory, that I have occasionally, contrary to general habit, taken note of the product. The daily yield of milk by each cow, has at times reached forty pounds, and sometimes exceeded that weight. This quantity of milk has yielded butter fully up to two pounds per day to each cow. The quality of the milk of the two cows did not perceptibly differ. By a trial during the last week in October, 1858, the smaller cow made eleven pounds of butter. She dropped her calf in May preceding that trial, and again in May following it. I raised this cow's calf of 1857. She is now larger than the mother, and brought a calf in July last, at the age of twenty-six months. The calf was taken away at the end of five weeks—after which, I have found by occasional trial, her milk weighed very uniformly during August, September and October, twenty pounds per day.

We will here dismiss the cream of our subject, for the richer theme of,

6th. *The attainment of manure.* What is manure? It is the stuff out of which plants are made.

It has been said, "The chief business of farming, is bringing manure on to the land, and carrying produce and cattle off of it"—connecting together the manure and produce as *cause* and *effect.* The late Rev. Henry Colman wrote for our instruction, "The success of farming must mainly depend upon such a conduct of the farm as shall not exhaust its productive powers; or rather, that it shall, from its own resources, furnish the means, not only of recruiting its strength, but of actually increasing its capabilities of production. There is no more obvious way of doing this, than by consuming the

produce of the farm, mainly, in feeding animals, through whom the riches of its vegetation may be returned in a form to furnish other and better crops."

However advantageous it may prove in many cases, to use various artificial manures, we should not rely on them to any great extent. Enormous adulterations of these articles of commerce are practiced. No man purchasing a valuable manure one year, is certain of finding it the same the next. There is a disagreeable side to the picture of *the morals of trade.* In the interior of the State, we must rely almost wholly on our home resources for manure.

We have been abundantly and ably lectured on the importance of saving manure, liquid as well as solid; but in connexion with soiling, the subject may be again presented, from a consideration of its magnitude, without an apology for the space it may occupy.

Mr. Quincy says, "Taking into consideration the advantages resulting from the urine saved by means of loam, sand or some imbibing recipient prepared to absorb it, it remains to show that the cost of raising food, cutting it, and distributing it to the cattle, is compensated by these savings. Upon this point, my own experience has satisfied me, that the value of the manure alone is an ample compensation for all this expense; leaving the saving of land, of food, and of fencing, as well as the better condition of the cattle, as a clear gain, from the system. As an evidence of this, I state my expenses for labor in conducting the soiling process.

During the month of June, I hired a man to do every thing appertaining to the soiling process; that is, cutting the food, delivering it, taking care of the cattle (twenty cows) in the day time, for fifteen dollars the month, he finding himself. In this arrangement, it was estimated that I availed myself of half of his labor. At the end of the month, I had the manure measured; and I found that the manure collected in my barn cellar, amounted to fifteen loads—this did not include that which was made in the yard during the four hours each day—a quantity of manure which I could not have placed on my farm for thirty dollars.

During the remaining five months of the soiling season, I added another man, because I found that a great economy in vegetable food would result from cutting it into pieces, and mixing with it about one third of cut salt hay or straw. This was done; and I

kept an accurate account of all the labor of cutting the food in the field, bringing it into the barn, cutting it up there, cutting salt hay or straw to mix with it, mixing this food and delivering it to the cattle; and found that it amounted to one hundred and forty eight days' labor. This estimated at a dollar the day, adding fifteen dollars paid in the month of June, makes the whole expense one hundred and sixty-three dollars. The manure at the end of the soiling season, certainly equalled one hundred and twenty loads; and could not have been bought and brought there, for three hundred dollars."

Adam Anthony says, "The cows go to pasture for a slight picking, for water and exercise, morning and evening. Their summer feed at the barn, is rye from early in May, succeeded by clover, millet and corn. By supplying the stables with peat and muck, three hundred cords of excellent manure are annually made by the stock." In a former quotation from this gentleman, it will be seen that his stock is given as about forty head.

Soiling is practiced by the Shakers at New Lebanon, N. Y., and they claim that the superior quantity and quality of the manure is sufficient to defray all the extra expense of cutting and feeding. It is all saved, and being preserved under cover, is of great strength and energy.

I find abundance of testimony to the effect, that by soiling, the quantity of manure is more than doubled, upon the same stock.

Quincy says, "It may be adopted as a general axiom, that soiling is the cheapest of all modes of obtaining manures. In this point of view, the saving of fence, the economy of land, of food, the increase of milk, and the better condition of cattle, may be considered as incidental to the system, as an offset for the labor requisite; giving the manure made as a clear gain; and what is more, without the loss and trouble and expense of carting from a distance."

From the benefits reasonably expected to accrue through the adoption of the soiling system, by reason of the vast increase of manure, I urge its claims upon the farmers of Maine, as a practicable process, at once cheap and easy, within the resources of every one, sure to supply the great and universal want, (manure,) and leading directly to a higher and more satisfactory condition of husbandry.

I urge the claims of the system, through the conviction, based on my own exprience, that our soil and climate are as well adapted to

secure its benefits, as that of any other country. No climate is better than ours, for the growth of clover and corn. We need not look to Europe with the view to adopt their crops of tares, vetches, lucerne, peas, and so forth, neither shall we find it necessary to grow rye, oats, buck-wheat, and so forth.

Grass, corn and cabbages, with the tops of our carrots and mangolds, will furnish us with as sure a succession of feed, as if we were to embrace a dozen other crops. Any succulent vegetable relished by cattle, may be used; and these may be adopted at the discretion of every farmer. The best rules that could be drawn from past experience, I would not offer you to-day for your guidance in this matter, with any expectation that they would hold good for coming years. Italian rye-grass, of which more than one variety has appeared in England, and in this country, is highly recommended as a soiling crop. Mr. Kennedy, of Ayrshire, Scotland, sowed twelve and one-half English acres, and during three months, after it had grown to a size for cutting, it afforded feeding to eighty head of fatting cattle, and twenty horses. The horses had oats, and the cattle four pounds of oil-cake daily. Twenty of these cattle gave a profit of $12,50 a head for six weeks' keep.

I have not time now to extend this communication so as to embrace all that should be said in this connection. The system I here advocate has reference to arable land; to every man's land which admits the plow and the scythe. Its full or partial adoption will improve the condition of every farmer who wants manure at a cheap and easy rate. It should be adopted at once in nearly every case of that great number to be found in and around our cities, towns and villages, who keep one or two cows. It should be adopted by our ten, fifteen, or twenty-acre men; as upon it, they may build up a most prosperous husbandry, with little capital or risk.

The nature of many farms in the State will not admit the system in full. With rocky land, enclosed with substantial fences, yielding good pasturage, and not easily and quickly restored to wood, soiling has nothing to do. The system once fairly introduced, would vastly benefit the State by causing many a rocky plain and hill-side to be returned to grow valuable wood and timber.*

* An American gentleman of considerable celebrity, once said in an Agricultural address, "One of these days I mean to take time to write a much needed essay on 'the art of letting land alone.'" I hope this promised *essay* may soon appear. The

In regard to the present condition and future prospects of Maine agriculture, we have much to commend and much to hope. *Mind* is active—inquiring; and the inquiring mind is subject to the universal law of *progress*. I have but a single remark to make o existing habit and practice. I am satisfied that the prevailing habit and practice in farming, (it is not well to call it system or method,) is continuously working a deterioration in the acreable hay crop.

I have for many years been in the practice, in early summer, of asking every farmer I met, "How is the grass looking in your neighborhood?" "Is your hay crop coming in heavy?" "This seasonable rain ensures an abundant hay crop." "This fine weather, with frequent rains, is the best that could be ordered to secure a heavy crop of hay." With such questions and remarks, I would draw out the opinion and impressions of each on this important crop. The result of this course shows that nobody is satisfied with the weather. About nine in every ten will reply in these words: "Well grass is light; particularly on old fields." Even the last season—such an one as is rarely witnessed in a life-time—which, from its opening, seemed specially designed to produce a most luxuriant forage crop, could not silence the croakers. All would admit that "newly seeded fields were excellent," "but ——."

Now such a succession of unfavorable seasons is very disquieting to an agricultural population, to say the least; and should lead us to inquire, if we may not in some good degree, secure an immunity from such natural evils.

Too much cannot be said in favor of corn as a forage crop, to be used for soiling, as an adjunct to pasturage, or as winter food. Six tons per acre of dry fodder, is easily obtained; and it is generally rated as of equal value with good hay. In some of the States, it is claimed to have been produced at an expenditure not exceeding one dollar and a half per ton, when hay was worth from seven to eight dollars per ton.

In my practice, I have usually grown more than I have fed in its green state. In one case, I had about one half a winter supply of fodder for my cows from this source. It is usually recommended to

profits of many productive acres are absorbed in ruinous half tillage of fields which were better left entirely alone. It is bad enough to pay taxes on unproductive lands; it is too bad to spend labor upon them. C. C.

sow corn at successive times, so as to have the fodder in a tender state through the latter part of the season. I have seen no occasion for this course, particularly when the larger varieties are grown. I never found my corn fodder too large or too mature. When the cows begin to reject the stalks, I practice running the whole through a cutter, and it is then eaten without waste. So for winter food; the more mature the stalk, the more nutriment it contains, and the easier it is dried.

I hoped in the outset, to present in this communication, some general rules for practice, as initiatory to "soiling," as a system to be adopted in our state; but through a want of time I am obliged to omit very much that is relevant to the subject, and must leave it in this unfinished condition. I have no higher ambition than to be identified with the ennobling science and art of earth's culture, and to stand in the working ranks and speak an occasional word, as circumstances may seem to require. With an earnest desire to do good, and with a hope that the present effort will not be wholly in vain, I remain, &c.

Farm Architecture.

By Wm. D. Dana, Perry.

Several years ago, I had the privilege of submitting to the Board of Agriculture, a rough outline of what was designed to be an institution to carry out the system of common schools, viz: a free university of the highest grade, where every child of the State could obtain the most thorough educational training, as free of cost as he now can obtain the rudiments in the free common schools. This plan was thought to be too Utopian for practice, yet I hope the day is not distant, when the principle will be embodied in some such form.

The subject has been recently presented to my mind, as showing the need of such an institution, in one, and that a humble direction, by observing throughout the State, the want of knowledge and want of taste exhibited in the location and construction of buildings, particularly of farm buildings.

When any considerable number of our farmers' boys, from all parts of the State, shall have had the advantage of such training and illustrations as such a "Model Farm," "Farm School," "University," (or whatever other name may be given to the institution) is intended to give, we shall see a change in agricultural architecture. The inconveniences and discomforts now existing, will, in new erections, be avoided, time and labor be economized, and beauty, convenience, comfort and profit, take the place of ugliness, inconvenience, discomfort and loss.

In order to do something to promote so desirable an end, I propose in this paper, to discuss the necessity of reform, the causes of this necessity, the importance of a reform, and the means.

The manufacturer so arranges his buildings, that every operation is performed with the least possible expenditure of labor. He well knows that this forms a large part of the cost of his fabrics, and failing to save here, he fails of success. With the farmer, more than with any other class, does labor enter into the cost of his productions. The raw material, and the forms into which he molds it, whether food or clothing, animal or vegetable, are all the product of labor; yet look where we will, throughout the State, and in almost every instance we find farm buildings built without any reference to the wants of the farmer, the economy of labor, or the comfort of man or beast.

How rare the instances where a farmer has, before commencing his buildings, made or procured any general plan, or even had one in his own mind, and how still more rare the cases, where beauty of design, and architectural appearance, had any place in that plan. Very few farmers would think of the extravagance of paying a few dollars to an architect for a plan of farm buildings; yet by so doing he would, in the end, save hundreds; and by the substitution of beauty for deformity, add to the money value of his estate.

"All men have their prejudices," and none more than the farmer; and on this last topic, these prejudices would be saying, "give me the useful; let those who have money to spend, study the beautiful." Let us lay aside, if we can, our prejudices, and we shall see that the useful and the beautiful are not incompatible; and that a house and barn, built in good taste, well proportioned, and well situated, with respect to each other and to the natural features of the

landscape, need cost no more than such a structure as we often see, not possessing these elements of beauty.

I have said that we find farm buildings built without reference to the wants of the farmer. How common it is to see a house with several unoccupied rooms, and the arrangements such as to require a large amount of unnecessary travel to do the daily labor. How still more common to see the house so small and inconvenient as to sacrifice comfort, and sometimes, health and morality; and how rare to find the barn and out buildings arranged, as to plan and location, so as to give comfort to the inmates, and suitable facilities to their attendants. How common to see them open underneath, and open at the sides; the light being admitted only through the open doors or windows, or through the open cracks of the loose boarding.

There is an unfounded prejudice, that hay will not keep well in a tight barn; hence they are left without shingles upon the walls. If the theory of Leibig be true, that animal heat is kept up by the consumption of a portion of the food as fuel, which would otherwise go to form fat or flesh, it becomes an interesting and practical problem, to learn how much of this costly fuel may be saved by keeping our barns warm; how much, for instance, would be required to keep the carcass of an ox, or say his equal weight of water, up to the point of animal heat, for twenty-four hours, in a boiler, exposing the same amount of surface to an atmosphere at zero.

Go where we will throughout our State, and everywhere the proof meets us, of the necessity of a reform in our farm architecture. The causes of this necessity may be traced, in a great degree, to want of proper education. Our boys at the common schools, learn to read, write and cypher, but they don't learn to observe and think. Living at home upon the farm, and in general, having but small means, they have not the opportunity to go abroad and see what others have done. Having little time and less inclination to read and study, (I speak of the mass) they do not seek for information in books and papers, and even if they sought it, it would be hard to find. Having no knowledge of architecture; nine out of ten not knowing the meaning of the word; many never having heard it, and few imagining that men make a business of designing and drawing plans of buildings, they do not seek its guidance. But beyond and above all, being in haste to marry and settle in life, they do not

wait till judgment has matured and means accumulated, but begin, in most instances without money, to put up something to live in, and something to shelter the hay and the steers from the weather; copying perhaps from the best models within their knowledge, and always designing, when they get able, to build a better house or barn; or to finish and improve the structures already erected. No wonder, under such circumstances, that improvement goes on slowly, and that houses and barns are without beauty, convenience or comfort.

The importance of reform in rural architecture, arises from two considerations, viz: its material and its moral influence; its effect on the pocket, and its effect on the character and habits of a people.

Where a man's time and labor constitute almost his whole available capital, it requires no argument, to show that every unnecessary expenditure of it is a loss; and yet many would be surprised to see how much labor they perform, which might as well, with suitable arrangements, have been saved. The man who travels two hundred rods daily, to do what might be done by traveling one hundred rods, walks, in a year, more than one hundred miles, uselessly; and many do this. The woman, in house-work, who, by a better arrangement of rooms, can save the same amount of travel—and it might be done in many large farm houses—would have an additional half hour each day, for reading or for rest. The putting of hay into the barn, and putting the manure out; the feeding and watering of cattle; the tending of hogs; and supplying the house with wood and water, are all susceptible of being done with much less labor than they now require, in a great majority of cases. Each half day spent by a farmer, in driving his cattle through snow drifts or over icy roads, fifty rods or more, to the watering place, is so much taken out of his income, as a half day of labor would earn. Many a farmer can understand what are the trials and vexations of this operation, in a driving storm, or a day like many in our winters, and his cattle, shivering and trembling, say plainly enough, how terrible to them is the process, by turning and making a rush for the barn, at every opportunity; choosing rather the sufferings of thirst, than the terrors of the weather or the ice. How much loss of beef and tallow results from such a course, it is not easy to estimate.

How many give up the culture of root crops for cattle, from an experience of the labor of feeding them out; where for want of a

barn cellar, they have to be carried some ten rods or more from the house to the barn. Here also is a loss of labor or a loss of beef, or both. The farmer's profits are small under the best arrangements, and will not bear to be lessened by small leaks. Like some large manufacturing establishments, the difference of a small fraction of a day or of a dollar, in the production of results, is just the difference between success and failure.

In the house, every extra door or window, every unnecessary foot of floor, are to be kept painted and cleaned; every unused or useless room is to be taken care of—to say nothing of furniture; and the extra labor for these things deducts so much from the wife's productive labor or necessary recreation; or more usually, incurs the expense of hiring help.

I have spoken principally of the loss of *labor*, by inconvenient arrangements; but there are other serious losses sustained by nine tenths of our farmers, which properly built barns would prevent. The loss of hay, wasted under the feet of cattle; the loss of flesh, from exposure of cattle to cold and discomfort; and more than all, the loss of all the liquid and a large part of the value of the solid manure, the house slops, the night soil and the domestic guano.

Too much time has, perhaps, been taken up with these details; yet if one farmer who is about erecting buildings shall hereby be induced to look more thoroughly into his wants, and to build accordingly, this will not have been written in vain.

As to the *moral* influence of our rural architecture, it would, perhaps, be going too far, to say, that it causes vice or tends to bad habits, directly; or that in the cases of the better kinds, it leads to virtue or restrains from sin, directly; yet that the house we live in, has an influence upon the mind and character, is I think, self-evident, or susceptible of proof. I have somewhere read of an artist who would never allow himself to look at an object of deformity. Things of beauty he would contemplate, and thus have his mind filled with none but beautiful images, lest the deformity should manifest itself in his creations. His idea was a correct one, and may be applied to our subject. Let a child live in a house, which, with its surroundings possesses no element of beauty; let him be accustomed to see only such in his daily walks, and will not the mind in some degree, partake of this want of attractiveness? Do not the images

which are constantly presented by the senses, become a part of the mind itself? But this branch of the subject, I must leave to abler pens. The mind and influences by which it is moulded, is too vast a subject for my humble efforts, and yet I think I can see how a better rural architecture would tend in some small degree, to a better state of morals in the community.

Great results sometimes arise from very little causes. The statistics of crime in Massachusetts, show that it has increased threefold in fourteen years; and that this increase of crime is, in large measure, not among the foreign, but the native population. Every well wisher of his country must say, What are the causes? What the cure? Some will see one thing and some another. I will suggest that by some means or other, the life of a farmer is made unattractive to farmers' sons. The cause of this may be in the nature of the occupation itself; its severe labor; its little pay; or, it may be in its unattractive accompaniments, of which the rural architecture forms no insignificant part. The *result* is, that farmers' sons leave their country homes and become inhabitants of cities, where the honest avenues to wealth are not sufficient for the multitudes there seeking her, and many, in consequence, turn into forbidden paths. If this be, even in small degree, the cause—and perhaps every one can call to mind one instance of a fall from virtue, in a young man, on leaving a virtuous home—it plainly enough says, make home more attractive. I leave this suggestion here, for every one can see the possible connection of an unpleasant home, with the vice of the country or the city; and every thoughtful man can follow out the details, and so far as in him lies, second this feeble attempt to make our country homes more pleasant.

Having, as I think, pointed out the necessity of a reform in our rural architecture, it remains, to endeavor to show how such reform may be brought about.

If I have rightly considered the causes of this necessity, the means are already suggested. Knowledge of the necessity and knowledge of its causes, will lead any sensible man who intends to erect buildings, to aim for the best plan, and will suggest the mode of obtaining it. I would place, then, at the head of the means of improvement, a more enlarged and liberal system of common school education, and I would have it so broad as to embrace the whole range of science.

This would enable farmers' sons to take broader views, and, as applied to the particular subject under consideration, lead them to think and to see what the necessities of their business would require. Let those who intend to make farming their business, have the opportunity of obtaining a liberal education—I don't by this, mean such an education only, as our colleges afford. Let them when they have learned to read, write and cypher, learn the more important lesson, that there is something more to learn; and when the primary schools shall have done their part, give them the opportunity, from which they are now cut off by lack of means, to step from them into a free university, there to go through a thorough course of training of both body and mind.

Among the various knowledge there obtained, would be, perhaps the least, yet not unimportant one, of which I am endeavoring to treat. The buildings there, would of course be such as to teach by illustration, the best methods; the teachings such as to keep the mind awake to the concerns of every day life, as well as to the mysteries of science. Architecture there would have a place. and improvements would be constantly suggested and adopted.

The influence of such an institution could not fail to tell upon the appearance of the country. Farmers' sons who might decide to follow the occupation of their fathers, would bring from it cultivated minds and a correct taste, and in erecting their buildings, would unite the beautiful with the useful.

A correct public opinion is another instrumentality to bring about this or any other improvement; this, indeed, is only a consequence of a correct education; but there are other educators than the schools. The press is the most powerful; and when it shall exert its power to beautify and make attractive the country, to lessen the toils and increase the comforts of the husbandman, to turn back or stay the tide of emigration from the farms to the cities; it will have less occasion to deplore the increase of vice and crime. Let each of the three hundred and eighty-six towns of Maine retain at home, the five or ten young men, annually sent out to swell the cities' population; its own power would be increased, and the crime consequent on the rush of so many extra gold hunters, meeting the certain disappointment which, in many cases must result, would not have to be mourned over. Make farm labor less onerous, and the pay in con-

sequence greater, and one inducement to leave home is removed. Make that home attractive by its physical, intellectual and moral beauty, and many inducements to remain, are held out.

Plans and descriptions of farm buildings, published in agricultural journals, and in such other papers as have large country circulation, would tend also to the same end. If farmers themselves, who have good and convenient buildings, would furnish plans and cost of construction, with description, showing the advantages or disadvantages of particular arrangements, it might save some young farmer from error and loss, and consequent disappointment and disgust with his business.

Agricultural societies, by the offer of premiums for the best plans, models or essays, may bring the subject before the people in an instructive form.

Farmers' clubs may do much, by making rural architecture a frequent subject of discussion. Let a plan or model be submitted, with estimate of cost; let it be examined, discussed, and its advantages or disadvantages pointed out. Let each member produce a plan of his own buildings, and point out the actual results of such an arrangement, and show how much saving of labor may be made by a different one.

Lastly, let every one who feels that the true wealth of a country is in her soil, and in the ability of her citizens to develope its resources, do what he can to make the business of the farmer remunerative and desirable. Let him do what he can to remove inducements to leave home, by making the labor less and the pay greater, through more convenient arrangements, and by rendering the country attractive through her appeals to the love of the beautiful.

New Lands of Northern Maine.

About the end of August last, a party met at Phillips, in Franklin county, for the purpose of exploring a track for the continuation of the road leading northward from Farmington, (the present termination of the Androscoggin Railroad,) through Phillips to the Rangely lakes, onward, through unsettled territory to the boundary of Canada. Deeming this a good opportunity to examine

a portion of the new lands of the State, little known, but reported to present strong inducements for settling. I purposed to accompany this party, and proceeded as far as Rangely, but was prevented from going through, by reason of sickness in my family, which required my return home.

Rangely is now the farthest settlement on this route. The scenery about these lakes is beautiful, and the land fertile. One farmer, Mr. Abner Toothaker, informed me that, including pasturage, he had about four hundred acres cleared, one hundred and seventy-five of which had been under the plow. His crop of grain varies from one thousand four hundred to one thousand seven hundred bushels, of which three-fourths are oats, the average yield of which is fifty bushels per acre. Barley produces usually forty to fifty bushels, and sometimes, though rarely, sixty bushels, potatoes, one hundred and fifty to four hundred bushels per acre. Wheat has not been extensively cultivated, owing in part to weevil and rust. Indian corn cannot be depended upon to ripen well, but excepting this, good crops of all the various kinds usually grown in the State, are obtained. Mr. T. cuts about two hundred and fifty tons of hay, a portion of which is sold to lumbermen at from seven to ten dollars per ton, and the residue fed to stock, of which he usually has seventy-five head, and sometimes more. The capabilities of the soil of this vicinity were sufficiently attested by the aspect of abundance upon the farms generally, as well as by the appearance of the soil itself.

I am happy to give below, a letter from Seward Dill, Esq., of Phillips, who was one of the party, regarding the character of the country explored on this occasion, and I may add that his views correspond exactly with those of Mr. Millett, who also was one of the party, and from whom I have received a briefer communication on the same subject.

A consideration of no small moment, in estimating the advantages of these lands for settlement, is the facilities for intercommunication now existing, so different from what they were when the first settlers at Rangely came in. At that time, the nearest market town was Hallowell, and that approachable only by the rough roads incident to a far off settlement in the wilderness,—now, by going half as far, they may reach a rail road station, and this by a carriage road, which, although a portion of the country passed over is hilly, (pre-

senting, too, many views of exceeding beauty, and even grandeur,) will compare favorably with the better class of roads throughout the State. The larger portion of the road is, however, comparatively level, and following as it does the Sandy River, the fertility of whose intervales have well nigh passed into a proverb, the whole route is one highly attractive to the traveller who delights in varied scenery and agricultural beauty.

PHILLIPS, Oct. 12, 1859.

Dear Sir: In compliance with your request, I will furnish a brief description of the land over which we passed in our tramp to Canada line.

Immediately after leaving you at Rangely, we entered the woods on the land of Joseph H. Ellis. For the first five miles, we followed an old log road leading across a tract of tolerably good farming land, the growth consisting of maple, beech, birch and a mixture of spruce. The soil is of a brown color, deep and rich, although portions of it are somewhat rocky. In traveling the next five miles, we passed over a variety of soils; the first consisting of upland well adapted to tillage purposes; next, a small tract of swamp or wet meadow, well covered with spruce and cedar timber. From this meadow, we passed a gradual rise for a mile and a half, over a tract of as good land for *farming*, as can be found in Franklin county. This land slopes gradually towards the south—growth hard wood—soil rich and deep, and nearly free from stones. On the north side of this hill, sloping towards the Kennebago Lake, the land is not so good, it being somewhat broken and rocky.

Here, being warned by approaching darkness, and feeling somewhat weary, we caught some fine trout from the lake, served our evening meal, and camped for the night on the shore of the Kennebago.

The following morning we constructed a raft, on which we crossed the foot of the Lake, and came upon some of the finest interval land I have ever seen. Thence we traveled in a northerly direction along this interval until we struck the Lake of the Hills; we crossed the foot of this Lake and traveled along its shore about two miles. All the land bordering on these lakes and streams is of the very best quality—the soil black and rich—and we could easily thrust a cane

into it to the depth of two feet. From the Lake of the Hills, we pursued a due north course, until we reached the height of land between this State and Canada, a distance of some ten or twelve miles. We found the land over which we passed somewhat broken, consisting of hills and valleys. In all these valleys we found some good interval land, and much good timber, consisting mostly of spruce, but occasionally a pine.

The hills over which we passed, present a very singular appearance; the sides being rocky, while a large space on the tops of each is almost entirely free from stones. Some portions of these hills would make good farming lands, especially for pastures. The point on the high lands, where we struck the Canada line, commands one of the finest views I ever beheld. To the east and north-east, we look down upon a valley some six miles wide, and extending east to Dead River, a distance of twelve or fifteen miles. A large portion of this valley is covered with spruce. Our company pronounced it the handsomest they had ever seen. From the point above mentioned, we could see a large number of lakes, Dead River settlement, the town of Rangely, and a part of the beautiful valley of the Capsuptup, in the county of Oxford; also Arnold's River in Canada.

In the valley above described, there are seven beautiful little lakes, all tributaries of the Kennebago. Near the head of the northernmost lake, is a natural *pass* for a road through the high lands into the town of Woburn, in Canada.

After making what observations we could, and camping one night on British soil, we descended into the valley, and followed the stream down to Kennebago Lake. On both sides of the Kennebago stream, from its head waters to Rangely, nearly all the land is of the first quality; much of it being interval and meadows, from one-quarter of a mile to a mile in width, where we find upland equally as desirable. The soil, (as before stated) black, rich, and deep; and its fertility is indicated by the unusually heavy growth it bears, consisting of maple, birch, spruce, and fir, as large and handsome as one would wish to see. Some of the pines will measure from two to two and a half feet in diameter, and are very tall and well proportioned. Many of the spruces our company judged to be from eighty to ninety feet, and some judged them one hundred feet high.

On the streams that we crossed, there are several fine mill sites, commanding good water power, which will become valuable whenever the adjoining lands are settled.

In conclusion, I will say, I am fully convinced that if the State *should encourage the settlement* of these lands by constructing, or aiding liberally in the construction of a road that would render them easy of access, and afford a way of transport for their produce to some of our commercial towns, she would soon reap a rich reward from their bountiful contributions to her agricultural wealth. As soon as a road shall have been constructed, scores of our enterprising young men will there make for themselves comfortable and happy homes, instead of seeking their fortunes in the distant west. When our State does her duty to her young men, they will not be unmindful of their obligations to her. Respectfully Yours,

SEWARD DILL.

To S. L. GOODALE, Esq.

P. S. While coming down the Kennebago Stream, our guide informed us that we were passing at the south-west, a tract of land of about three thousand acres, covered almost entirely with sugar maple growth. I would further add, as a fact worthy of consideration, when speaking of settling these lands, that the southern terminus of the road proposed to be opened, is within forty miles of a railroad station, (at Farmington,) which is more than can be said of any other such tract of land in the State of Maine. S. D.

It is a source of deep regret, that I am unable here to present a communication which was confidently expected, from the late Dr. Cuming of New Brunswick, upon a subject of great importance to the agriculturists of Maine, and which no person within the circle of my acquaintance, could have treated in so able a manner as he, but which he was prevented from preparing, by sudden death.

I have thought that a brief notice of this remarkable man might not be out of place here, as illustrating what may be accomplished by a poor farmer's boy, by dint of determined energy, industry and perseverance. If such an one under the disadvantages incident to a system of greater social inequality than ours, could rise from the position of a herd boy to marked eminence in a scientific profession, how great encouragement have the young men of our own country to aim at high attainments in science.

Mari A. Cuming was born August 12, 1813, at Myers, in the county of Banff, Scotland, where his father rented a small croft or farm. His parents being poor, Mari was sent from home at the age of nine or ten, to serve as herd boy, on a neighboring farm. Several summers were thus occupied, and during the winters he attended school. His whole school education during his minority did not exceed nine or ten months. Even at this early age, his active and ingenious mind busied itself during leisure hours, in the construction of various mechanical contrivances and philosophical toys, many of which are well remembered. From being herd boy, he was in due time promoted to the post of plowman, in which capacity he served, partly at home and partly upon other farms in the vicinity, until at the age of twenty, he was by his father's death, left tenant of the few paternal acres. His father's affairs were left in a very embarrassed condition, and it cost some years of toil to cancel the indebtedness thus inherited.

Although his school education was very meagre, he was all the while, like his illustrious countryman, Miller, acquiring a rich and varied education. Nature was his teacher, and well did he heed her

lessons. From a mere boy he was a great reader, and never neglected any opportunity for acquiring knowledge. His memory was singularly retentive, and whatever he learned was well digested, and arranged in so orderly a manner that it never failed to be available when wanted. He early joined a mutual instruction club in his native village, of which he became an active and efficient member, often contributing essays, and sometimes lecturing upon various scientific subjects which had occupied his attention.

At the age of twenty-two, he married, and the demands of a rapidly increasing family furnished active employment during subsequent years; but nothing could quench his thirst for knowledge, nor weaken his courage in attempting its acquisition. About this time he became acquainted with Dr. John Sheir, then lecturer on Agricultural Chemistry and Botany, at the University of Aberdeen, from whom he received much aid, both by personal instruction and by the loan of books. In return, Mr. Cuming reciprocated the favor, by conducting upon his farm series of experiments suggested by the Professor, and designed to elucidate doubtful points in Agricultural Chemistry. The very first season following the announcement by the celebrated German chemist, Leibig, of his peculiar views on mineral manures, and particularly of the use of bones dissolved in sulphuric acid, (superphosphate of lime,) a series of experiments were instituted by them, designed to test the practical value of these theories. The papers, now lying by me, show a lengthened correspondence on this subject—the minute directions of the one as to the proportions to be used, and the methods of preparation and application on the part of Dr. Sheir, and the careful and systematic carrying out of these directions, and the weight of the products upon the several plots by the other, possess much interest, but the limits of this notice forbid any details of these or other experimental researches.

Suffice it to say, that as he kept steadily on, the desire of devoting himself wholly to scientific pursuits grew stronger and stronger, until at the age of thirty-three, his wealth consisting chiefly of a wife and five children, he entered the Royal Veterinary College, at Edinburgh, as a student. Under such circumstances, it may readily be imagined that his labors were unremitting, and of his success, we can judge from the fact that at the examination at the end of his first year, he took a medal for chemistry, it being one of four

annually awarded for greatest proficiency in the several branches taught; no instance having previously occurred in the history of the college, where a medal had been awarded to any student except in his senior year. At his last examination, before graduating, he received *three* out of the *four*, awarded that year to the class, a circumstance equally unprecedented.

The writer has before him the schedule of one of these nearly perfect examinations, and on only two of the six pages of closely written matter, can be found any corrections by the examining professors, and these evidently attach to accidental omissions by haste, and not to mistakes of ignorance.

About this time he got no small reputation for an essay on "Typhus in Cattle," but the conclusions of his paper did not satisfy himself so well as they did others, and he continued his investigations until he ascertained beyond doubt, that the mysterious disease so fatally prevalent, and which he had deemed epizootic typhus, was in fact, the effect of poisoning by lead. He showed also, that loss from this cause was common in the vicinity of large towns—that cattle often obtained it from the street manure spread upon the pastures, and which contained tea-chest lead, scrapings of paint pots, &c., all of which he repeatedly identified among the contents of their stomachs after death.

After graduating with high honors, Dr. Cuming established himself in a successful practice, at Ellon in Aberdeenshire, and during the years of his residence there, repeatedly obtained the large gold medal of the Highland and Agricultural Society for essays which were published in their transactions. He was also connected with the "Scottish Farmer," at that time published at Aberdeen, for which he wrote many of the leading editorials.

His removal to New Brunswick was in 1852, upon the invitation of the St. John County Agricultural Society, and in the hope of finding a competent support, and a broader field of usefulness where veterinary science was almost unknown. Pecuniarily, he was unsuccessful; nor did pupils present themselves for instruction as he had been led to expect. Although he bore testimonials of the highest character, the people generally among whom his lot was cast, failed to see advantage by availing themselves of scientific skill, instead of employing quack "horse doctors" whose ignorance was

equalled only by their pretensions. To eke out the scanty income from professional services, he resorted to the pen, and became connected with the newspaper press at St. John. At one time he started "The Farmer," a magazine devoted to agriculture, but it failed for want of support.

Not long before his death, he removed to Kennebacasis, near St. John, where he hoped to find leisure to prepare a popular work on the applications of veterinary science to the wants of horse owners in this country. This he had long designed, and had he been permitted to complete the work, it would doubtless have placed his name high on the list of benefactors to American agriculture. His death occurring on the twenty-first of July last, was as sudden as it was unexpected, being caused by the rupture of a blood vessel while in the apparent enjoyment of usual good health. It deprived his family of a much loved husband and father, a large circle of friends of a true-hearted companion and judicious adviser, and veterinary and agricultural science of a staunch supporter and advocate.

Being by this afflictive dispensation, deprived of the pleasure of submitting the expected communication from his pen, I insert in its place a paper left by him, and which was evidently intended as introductory to the work on horse management above alluded to; and this because of the conviction that the lack of veterinary science which exists among us, must be more extensively and deeply felt, before measures will be taken to supply the need, and in the hope that his remarks may serve a useful purpose to this end. It is barely possible, also, that indicating as they do, the main features of a work which is exceedingly needed, their publication may, in some way, prove instrumental towards supplying this great desideratum in our agricultural literature.

"The horse, viewing him merely as one of the most beautiful and perfect of nature's creations, presents many points of pleasing and instructive study for the inquiring mind; but when considered in relation to the profits to be made from rearing him, his value as an article of commerce, and the many important services he performs for us, everything connected with his existence, his welfare and his usefulness, assumes a double interest, and yields advantage as well as pleasure by being known. In all intelligent communities, therefore, and among almost every class of men, the quality and value of horses, their performances, ailments, and management, are popular topics of conversation, and things about

which there are few indeed, who do not wish to be thought well informed.

But such knowledge is neither hereditary nor intuitive, nor to be acquired by mere outside acquaintance with the animal in health, or casual external observation of his diseases. That it may be reliable, and of use to us in our daily treatment of him, everything connected with his physical structure, his wants and uses, must be scanned and studied, first in its individual aspect, and then in its various relations. His natural history needs to be known, that we may understand his habits and constitution, and how to develope his qualities to the best advantage, in the artificial condition we consign him to. His form and anatomy must be examined, that we may judge rightly of his motions and proportions, and be able to detect with certainty the seat and nature of the injuries he is exposed to in our service. The physiology and uses of the different organs and structures of his body must be investigated, that we may be prepared to find out and comprehend the diseases and changes of condition, consequent on his domestication and usage. Chemistry, dietetics and hygiene, must be consulted, to show us how to feed and keep him, as best suited to promote his health and powers of endurance. Mechanics must be studied to make his labor give the best results, with the least amount of vital expenditure; and pathology and therapeutics known, to enable us to restore him to usefulness, when lamed or diseased.

Such are but the more important of the points of inquiry, that must be studied, before we can tell with any thing like certainty, what is right or what is wrong in our treatment of the horse: their investigation, arrangement and application being comprised in the less common and more scholastic term, veterinary science. And the bare recital of them is enough to show that more is required of those who would aspire to a proficiency in this kind of knowledge, than the mere practice of stable duties, horse shoeing or jockeyship.

As a proof of the advantages believed to arise from the special study of a subject of so great importance, the civilized nations of Europe have long ago devoted a portion of their attention to the cultivation of veterinary science. Colleges for teaching it have been established in almost every eminent seat of learning. Governments have aided its extension by patronage, employment, and pecuniary support. Men of talent and liberal education have become its practitioners and teachers. And some of the proudest names in human surgery the world ever produced, have helped it forward.

In these countries, therefore, and under such advantages, not only is every thing connected with the horse investigated by the light of science, and ascertained with all its accuracy, but the popular notions upon the subject among those classes of the community that are far beyond the immediate influence of study, are also generally true to nature, and practically useful, if not always strictly scientific. How different it was before veterinary science was cultivated, and how different it is still, where it has not been introduced, it is scarcely necessary to say. On these points, the absurd

and barbarous practices of the old English farriers, believed in then as well by the peer as the peasant, and the scarcely less hurtful, and certainly more expensive quackery, at present current in the United States, and upheld there alike by the public and the press, give the best evidence. It is not meant by this, that sound and trustworthy information about horse-matters, cannot be popularized without individual veterinary study; but it is maintained, that unless the popular ideas current on the subject, are derived from the inductions of science, and confirmed by enlightened practice and experience, they can neither be reliable in themselves, nor useful in their application.

From a practitioner of this science, therefore, no apology is needed for becoming its voluntary exponent, and advocating its diffusion, where not before introduced; neither does argument seem requisite to enforce the importance of the subject, or illustration to show the various ways in which it is interesting to every one in the community. When the author came to New Brunswick, some years ago, he did so, on the invitation of a few intelligent and spirited individuals, composing the board of directors of the St. John County Agricultural Society. These gentlemen had heard of the progress of veterinary science in other countries, and of the advantages arising from a knowledge of the structure and nature of the horse, in the treatment of his diseases; and they judged that one who had made this his study, where every facility for learning it existed, and who gave his whole time and attention to following it out, was the most likely to give sound advice, whether on the ailments of the animal, or for his general management. It was in this belief, no doubt, that they invited the writer to their shores, and it was assuredly in the hope of making himself useful in this way, that he came.

Veterinary science being thus, as it were, a new thing in the Province, at his arrival, it was to be expected that difficulties would be to contend with, and obstacles to overcome, before its claims come to be recognized, or its true position established in the public estimation; and such has been the case. Some of this discouragement which the author has met with has arisen, no doubt, from prejudice, and the opposition of parties interested in the continuance of empiricism and quackery in horse medicine; but the greater part, from a want of reliable popular information, about horses and their ailments generally, among the horse owning part of the community.

This deficiency of such knowledge about horse management, as is current in countries where veterinary science has not been some time established, has shown itself to the author in various forms. In the case of some (from previous entertainment of over sanguine expectations) disappointment has arisen, because impossibilities could not be accomplished, by curing disease without the use of time and means, or prescribing for cases without first seeing them, or having them sufficiently described. Others again, have erred on the opposite extreme, and because they could not comprehend the why and wherfore, and the rationale of the means prescribed, have disbelieved in the results that could be produced, even when these

were both practicable and useful. While a third and still larger section, judging, no doubt, of what science can accomplish, from what they have seen quackery and empiricism do, seem to hold that one man's notion about a horse is just as good as another's, provided it be asserted with sufficient force. It is needless to say, how inconsistent all such ideas are, and while their prevalence affords proof of the want of that intelligence in the community, concerning the nature and treatment of the horse, which veterinary science alone can supply, it presents at the same time, the greatest obstacles to its introduction. Nor is this all the evil it occasions. From the same cause, any one giving his attention to the subject, will daily see or hear of valuable animals being ill past chance of relief, before they are suspected to be suffering, or if deemed amiss, will find that they have been either neglected and uncared for, or subjected to a still worse fate from the hap-hazard doctoring of ignorant empirics, who are only thought wiser than their neighbors because they pretend more ; while all the time there flourishes and fattens a system of impudent, advertising quackery in horse medicine, with its liniments and nostrums, acting like a charm in every disease, that destroys ten for one it benefits, and picks the public pocket while laughing at its simplicity.

That such a state of things cries loudly for remedy, no one will deny; and as opportunity has offered, it has been the author's object, since he came to the Province, to diffuse sounder notions among all with whom he has had professional intercourse. It is but little, however, that one individual, acting only occasionally, and in isolated cases, can accomplish, in comparison with what is here needed to be done ; and as the press affords the means of instructing a thousand, as easily as one, he now adopts that method of address, hoping thereby to reach a number, whom distance otherwise puts beyond the limit of his influence, and also to benefit some, who, from prejudice, or want of better information, keep aloof from the aid they could have, often till it is too late to be of use, sometimes altogether.

When the author was first corresponded with about coming to New Brunswick, it was held out to him as highly probable, that young men from different parts of the Province would take advantage of the opportunity, for acquiring better instruction ; and he had much hope of this as a means of making known the value of the science. This hope he is grieved to say, has as yet proved an illusion ; and as the next best way that occurs to him, for attaining the same end, he offers a portion of that science to the public in such a form, as may be taken home to the farm or the stable, however remote they be, and there either used for private study and improvement, or kept for daily reference. In doing this, he thinks he is but carrying out in a liberal spirit the views of those who induced him to come here, and who have since so kindly patronized him ; and hopes that both the object and the endeavor, will be deemed worthy of public favor, however imperfectly the end may be accomplished.

It is not, however, because there are not already plenty of vete-

rinary books in print, that he feels himself called upon to publish another; neither is it because he has any new discovery to state or principle to expound, not hitherto known. Indeed, so thoroughly investigated, and ably written on, has every department of this science been, on the European side of the Atlantic, during the last thirty years, that to propose anything in it as a novelty, sounds to those familiar with the subject, as near akin to an attempt at imposition; and is only to be done after mature thought, and by those who have exhausted all previous ascertained knowledge on the point in question. But while this is expressive of the accuracy and fullness of English veterinary literature generally; there are but few works in it, of that popular and compendious kind, that suits the ordinary reader, and are at the same time, strictly true to science and nature, so far as they go. The reason of this, perhaps, is that where the science is best known, professional advice on matters connected with it, is so easily obtained, that literary information is but little asked for, people preferring in all difficulties, to consult a living and present authority; and consequently there is but little encouragement for the honester and abler class of veterinary surgeons, to write for the popular taste. Whether this be the reason or not, such is the fact, that nearly all our late veterinary works in which confidence can be placed, are either too voluminous and strictly scientific, or too limited in their range of subjects, to suit the general reader; while the few that have attempted popularity under such names as "modern farriers" and "improved horse-doctors" are but hashed up revivals of such things published perhaps fifty or a hundred years ago, when men fancied they could charm disease by spells and incantations; and consulted the signs and planets on the gathering of an herb, or the performance of an operation.

Of the few reliable English books of a popular kind, that have been published about the horse since veterinary surgery has been recognized as a science, none are suitable in their details to the conditions of American horse management. The difference of breeds, climate, feeding, and general treatment, between the two countries is such, that although the principles may be sound, and their application pertinent in the circumstances for which they were written, their aptness ceases, on bringing them across the Atlantic; and a reference to them for the treatment of disease, unless guided by a knowledge of the first principles of the science, is more likely to bewilder, than enlighten.

While this applies to even the best veterinary books written and published in England, it does so still more, to those that have been issued in America. Were it not a fact patent to observation, it would hardly be credited, that an intelligent and literary people like that of the United States, and loving horses as they do, have yet the first step to take, for placing veterinary surgery in the position of an art and science in their country. But so it is, and a veterinary literature adapted to the wants and circumstances of the western continent, has yet to be written. This is said in no disparaging spirit, but is simply expressive of the little that has yet

been attempted, in comparison to the greatness of the work to do; and if any one doubts its truth, let him point out the publications that exist to disprove it. In all of them, that the author has seen, the descriptions of diseases are too palpably English to be applicable to American circumstances; while the modes of treatment prescribed, wherever originality has been attempted, are too American to be of use in any but the slightest cases, or those that would do better if left by themselves.

By thus pointing out the poverty of the information furnished by the American press, on the subjects in question, the author does not wish it to be inferred, that he considers the present volume equivalent to filling up the void indicated. To do so satisfactorily, many subordinate inquiries will first have to be made and replied to. Known diseases will have to be investigated, and new ones peculiar to the country, identified and examined. Symptoms will have to be noted, terminations compared, and the action of remedies experimented on and established. Lameness, also, with its different situations, natures and causes will have to be reviewed, and even anatomical action and conformation verified, before a complete body of veterinary science, such as England possesses, and suitable to American circumstances, can be collated and put together. But this must be the work of many well trained minds, through a long succession of years, and in every variety of circumstances; and can only be effected when the country is able to educate veterinary surgeons for its own wants, the same as it does the members of the other professions.

The present work, therefore, has no such ambitious aim as that above alluded to; neither, as already mentioned, does it pretend to novelty in the pathological facts or ideas it contains; these being only such as have long stood the test of trial and experience in other times and countries. All that the author claims for it is, that he has adapted the veterinary science of Europe, as taught by the ablest British authorities, to the circumstances of the horse, as he has found them in America, so far as his observation has yet extended; and offers that adaptation as a means towards improving the general management of the animal, and a guide for his better treatment when attacked by disease, lameness or accident; that may be of use to those who have not the first principles or practical application of the science themselves, nor professional aid within their reach. His object, in short, has been to furnish a book for the *stable*, the *farm* and the *road*, that so far as it goes, shall be found true both to nature and science, (which is only experience arranged and systematized,) and at the same time so simple and concise as to be plain to the ordinary class of horse owners.

In carrying out this object, he has been guided in the way of doing it by the same common sense principles, that makes a traveler throw a stepping stone into the middle of a stream, when he finds it cannot otherwise be conveniently crossed. Science having heretofore, been but little recognized in this country, in regard to horse-matters, to have introduced it at once in a technical or abstruse form would have been much the same to the general reader

as placing the barrier of an impassible stream across the path of a traveler; the effect would be to make him turn back and go another way. For this reason, therefore, the author, in giving information on *matters* not generally known, has endeavored to adopt, as a stepping-stone for the reader, such a *manner* as could be most easily understood. And in stating scientific facts and explaining natural laws, and the deductions resulting from them, has selected the simplest possible language, so that those the least informed on the subject before, by reading may understand, and the difficulties of veterinary science be hardly recognizable under the simpler dress of "Outlines of Horse Management."

With regard to the *kind* of information the reader may expect in the following pages, a word or two of introduction will be enough. It is now a rule with those best versed in the art of conveying information to others, that to make it useful to the recipient, the judgment must be supplied with material for reasoning, as well as the memory stored with facts for recollection. In popular works on the diseases and treatment of the domestic animals, this idea has as yet been too little attended to. In such it is common to find rules for horse management, and directions for curing the diseases and injuries to which they are subject, laid down with as much precision as if the end to be effected were the measuring of a piece of joiner work, or the solving of a sum in arithmetic. The disease is named –the symptoms supposed to identify it stated—and then the cure—do so and so—give such and such—just as though the ailment were a positive entity, and every thing connected with it, matter of abstract certainty, and mathematical calculation.

Now although this style of writing makes a very plausible book to read, and seems to the uninformed when perusing it, to afford information of the highest value, it has this draw-back, that when it comes to be applied to the things spoken of as they present themselves in actual practice, there is often but little resemblance or coherency between them. Among the various diseased conditions that come under veterinary investigation, there are but few that when practically examined are susceptible of such precise definitions as those alluded to. Nor do the results which many of the particular modes of treatment are wished to produce, follow them in the generality of cases, with any thing like the certainty that one would anticipate, from the dogmatic manner in which they are prescribed. In the book of nature—at least in that page of it which the veterinarian has to read—unless when viewed through the light of first principles, there is much apparent confusion, and many causes of uncertainty exist; and the student who would rest the proficiency of his acquaintance with it, on the recollection of detached facts, and the possession of arbitrary rules of treatment, without the aid of scientific arrangement, and without understanding the why and wherefore of what he is about, will often find that the more he studies the farther he gets bewildered, and the longer he practices, the less successful he becomes.

Deeming it of advantage to his readers, therefore, to be possessed of sound general principles, that they can apply by the aid of their

own judgment, to every variety of case that may occur, rather than to be dependent in cases of difficulty on mere verbal knowledge and ready-made rules of treatment, often more likely to be astray than to the point, the author has studied in the following pages to avoid as far as practicable, the hackneyed though time honored style of many of those that have gone before him on the same subject.

In treating of diseases, and the means of curing them, he has studied more to explain the character of the deranged conditions existing, to elucidate the physiological proceedings by which recovery is effected, and to point out the most likely means of aiding nature in her endeavors for the restoration of disordered structures or functions, than to provide separate definitions and formula for every variety of disease likely to occur.

The author's aim has been in short, as regards the kind of information he has tried to impart, rather to enable his readers to judge correctly for themselves what they should do in any particular case, than to supply them with rules of practice for which they could give no reason. Being convinced that where the first principles of treatment are understood, and a moderate amount of common sense exists to direct their application, there is a much better chance of success, both in the prevention and cure of disease, than there is without such knowledge, though possessed of all the "valuable receipts" and "infallible remedies" that the impudence or avarice of designing charlatans have ever puffed into notoriety."

Agricultural Education.

By education, in its largest acceptation, is understood the development or drawing forth of the powers of the mind,—strengthening it by exercise, bestowing upon it the habit of learning, and the power of acquiring knowledge. This is of infinitely greater importance than any amount of information which may be obtained. Knowledge is of greater or less value as the case may be, but teachableness, or that attitude of mind needful for the ready reception of knowledge, is beyond all price.

Education should commence in youth, while the mind is disengaged, impressive and supple, and that course of mental discipline is the best, let the particular studies pursued be what they may, which in incidental and necessary connexion with learning what may prove useful in later life, shall best develope the powers of the mind and secure the ability to learn.

When we speak of education in reference to any particular business or pursuit in life, it is used in a secondary and more limited sense; and by agricultural education is understood the special training needful for the skillful and profitable performance of the duties and labors of a farmer. And in considering this, it naturally divides itself into two parts, unlike in themselves, but equally necessary, and both indispensible. And the first is the acquirement of skill in the practical performance of the multifarious labors of the farm: such as the plowing of land, the sowing of seed, the harvesting of crops &c., &c. This is to be gained only upon the farm, by seeing the labors performed, and by the actual performance of them. No more may a man expect to be a successful farmer in this country, without practical dexterity and handicraft experience, than he might expect to be a successful shoemaker without practice in making shoes. But this alone is far from constituting agricultural education; even in the loose language of common conversation, we do not speak of a man as having been educated to be a carpenter, or a blacksmith, but rather as having served an appren-

ticeship, or learned a trade; and training to the practice of any art, is essentially apprenticeship, and not education; and this brings me to the second point.

To be educated for any profession or pursuit, a man must not only be familiar with the execution of its details, but he must understand its theory, and be familiar with its guiding principles. We frequently hear agriculture spoken of as a science of itself; but to me it seems that this is not an accurate mode of expressing the idea intended, and I would rather consider it as an *art* depending upon, or closely related to, very many branches of physical science, and which need to be understood in order to secure the most successful practice. Some of these we will notice, and the first is, the Science of MECHANICS. So far as cultivation is concerned, and this is a most important part of agriculture, it is chiefly mechanical. The pulverization of the soil, the deposition of seed, the gathering of the ripened harvest, are bodily labors, requiring only a low degree of intellectual effort; but the science of mechanics teaches us regarding the laws of motion, and the application of power, obedience to which secures easy accomplishment of labor, while the violation of its principles, inflicts unnecessary and exhausting fatigue upon man and beast.

In a country like ours, of cheap land and dear wages, there is nothing of more vital importance to successful agriculture, than economy of labor. We can see that the introduction of steam and machinery have wrought a complete revolution in many branches of business; we see already some saving upon the farm, by the introduction of the cast iron plow, the cultivator, the horse-rake, mowing machine, threshing machine, and other improved implements, and we know that there is scope for vast improvement, both in the machinery now in use, and the farther substitution of brute or other force in place of human labor.

The value or efficiency of any implement, or machine, depends upon its conformity to the laws of mechanical philosophy; and without an understanding of these laws, the farmer would fail to comprehend the principles which govern the draft of a plow, or the action of any implement in use upon the farm; he would be unable to choose a good from a bad one, and ill prepared to use a good one to best advantage, or to correct any accidental hitch in its working.

When we look at our clay soils, richer than most others in the materials of which plants are made, but in a good degree locked up from use by their cohesiveness, and needing only mechanical treatment and weathering—thorough pulverization and mellowing, to become highly productive, who will say that mechanical science may not yet do as much for these, as chemistry may do to fertilize sand barrens?

Soils having been originally formed by the exposure of rocks to atmospheric influences, and their fertility being increased much in proportion to their farther exposure to the same influences, these having the effect to render soluble, and therefore available, their mineral constituents, who will say that some economical application of power may not yet be discovered, which, in the manner indicated, shall add materially to the fertility of all soils, and accomplish as much or more for agriculture, than chemistry can do?

The relation of GEOLOGY to agriculture, grows out of the fact that soils which cover the earth are the broken down or disintegrated particles of the rocks of which the whole originally consisted. There is a great diversity between soils originating in the primary, secondary, tertiary, diluvial and alluvial formations, and a knowledge of the nature of these formations will assist very considerably in forming an intelligent estimate of the character and value of soils derived therefrom, but alone, it is insufficient, and CHEMISTRY offers her aid, not only in estimating the general character of a soil, but in revealing its elementary constituents and inherent properties. It is the province of this science, also, to analyze plants and ascertain their elements; to determine the sources whence they derive their food; to tell us of what that food consists, and in a word, to reveal the laws which determine the fertilization or sterilization of the soil. Chemistry has already accomplished much for the farmer, and beyond all doubt, it is destined to do vastly more in time to come. Its present imperfect condition is not to be wondered at, considering its very recent date. The first actual contact of chemistry with agriculture is said to have taken place within the memory of many living, when the question was submitted to Sir Humphry Davy, whether it were better to employ the dung of animals for manure in a fermented or unfermented state. The experimental researches of this eminent father in chemistry, which were instituted with a view of solving

the problem, are believed to be the first contribution to agricultural chemistry which were deserving the name. Chemical affinities are constantly in play, and combinations of curious interest are everywhere and all the time going on around us. Whether we kindle a fire on the hearth, or burn a coal pit, or get up a gentler warmth to forward tomato plants in a hot bed; whether we bake bread, brew beer, make soap, pile a heap of compost, or cock up hay, we bring into play laws of chemical action, and *he who best understands these laws, can best control their results to a profitable issue.*

Important and invaluable as are the services which chemistry has already rendered, and may be expected to render in the future, to agriculture, in common with other arts, it is much to be regretted that such extravagant and unwarranted expectations have been indulged in regarding it. To hear some over sanguine people talk of the influence of chemistry upon agriculture, one is tempted to believe that it has but to utter a magic word and the desert would forthwith blossom as the rose. The truth is, that many of the questions asked of chemistry by agriculture, are of a far more difficult and complicated nature than those asked by most other arts. The elementary substances of which plants are composed are not only numerous, but they exist in them under many different forms and under many varying combinations; nor is this the only source of embarrassment, for their relations to one another, to the soil whence the plant springs, and to the atmosphere with which it is enveloped, are farther complicated by the action of—a something—of which we know absolutely nothing at all, except that it possesses wonderful activity and potency, and which we call *life* or the *vital principle.* So true is this, that of numerous problems in agriculture, it is impossible to say whether chemistry or physiology might be more properly interrogated for their solution.

Let me here quote from Prof. Anderson of Scotland, who as an agricultural chemist, is universally admitted to have achieved a position in the foremost ranks of science :

"The application of science to agriculture is a subject on which so much has been said and written, during the last few years, and which has occupied so much of the attention of the agricultural public, that it may seem almost superfluous to add to what has already been penned. It has always appeared to me, however, that there are still many points of great importance for the practical

man to consider, which have either never been sufficiently prominently presented to his view, or which from their being less striking, or perhaps less enticing, have been allowed to fall into the back ground, and have hence led to a certain amount of misapprehension in regard to the exact position of science and its relations to practice. Such misapprehension it is highly desirable to dispel. The farmer and the chemist should come to a distinct understanding with regard to the mutual bearings of scientific and practical agriculture—the manner in which they may be made to assist one another —and, what is of all others the most important point, how they can be made to co-operate, so as to establish on a firm basis the general principles of agricultural science, which must necessarily be the first step towards the development of a scientific practice. Under these circumstances, I have thought that I might advantageously refer very shortly to some of these matters, and point out what we are in future to expect from the application of chemistry to agriculture, the more especially as it is not very difficult to perceive that the interest which attached to it has somewhat abated with the general public, though I believe it to be undiminished with our most active and intelligent practical men.

This very diminution in the interest attaching to chemical agriculture, I believe to be mainly founded on one of the most serious misapprehensions—serious alike to agriculture and to chemistry—with which we have now to contend; and that is the erroneous and altogether extravagant expectations which some persons entertain, regarding the extent and rapidity of the influence which chemistry is likely to exert upon agriculture. To hear them talk of it, one might almost imagine that chemistry, as by the wand of a magician, is at once to spread fertility over our barren moors and raise abundant crops where nothing ever grew before; and that the chemist can by a few simple experiments, determine with absolute precision, the circumstances under which the farmer must go to work so as to produce an abundant crop. It needs not to be mentioned that such views are the exception, not the rule; but between this extreme case and those likely to be fulfilled, there are many expectations which, with less apparent extravagance, are equally beyond the powers of chemistry in its present imperfect state, and involve questions which, if they ever can be answered, must await the advance of pure science to a point much beyond that to which it has yet attained. Nor is it, perhaps, matter of much surprise that such expectations should have been entertained, as it must be admitted that the general public is not in a position to estimate correctly the extent of the benefits which it is likely to derive from the application of science to any art; and unfortunately in the present instance, it has been misled by the far too laudatory terms in which the application of chemistry to agriculture were talked of some years ago. Hopes were then excited, which to those intimately acquainted with chemistry, it was very evident could not be sustained, but which the enthusiastic embraced at once; only, however, when they were disappointed, to abandon as worthless, the whole science itself, along with the unobtrusive modicum

of real progress, which was altogether lost sight of amidst the ruins of their lofty expectations. Even those who take a more cautious and sober view of the progress of agricultural chemistry, are apt to be led into expectations greater than facts justify, by the extraordinary progress which the application of chemistry has effected in some other arts; such for instance, as the art of bleaching and the manufacture of soda, which chemistry, by one great stride, raised from the state of primitive rudeness in which they had existed almost from time immemorial, to one at least of comparative perfection. Such facts may lead us at first sight, to expect that the application of chemistry to agriculture should be followed by equally rapid results; but a little further consideration seems to point out a very material difference between such arts and the cultivation of the soil. In such a case as the manufacture of soda, for instance, and indeed in all those in which the application of science has produced the most marked results, the chemist has presented to him for solution a definite and circumscribed problem, involving the mutual relations of some three or four different substances; and he is able to trace the changes which the coal, common salt and lime employed, undergo, from the commencement of the process through each successive step, until the soda is obtained in the perfect state; but in the art of agriculture each question frequently involves, not one, but many problems, connected with the highest and most abstruse doctrines of the science, in which not merely chemical forces, but the far more recondite phenomena of life come into play, and in which the investigations of the chemist are carried on, and his conclusions tested under the influences of weather, climate and many other perturbing causes.

The extreme complexity of the problems with which agricultural chemistry has to deal may be conceived from the fact, that most plants contain from twelve to fifteen different substances, all essential to their existence, the relations of which must be investigated before definite views can be obtained regarding the changes which go on in the organism of the plant. These relations, moreover, are far more complicated than even the number of the elements alone would lead us to suppose; the single element of sulphur, for instance, which does not constitute more than two or three parts in the thousand of most plants, exists there in not less than three different forms of combination, in each of which it is as essential to the plant as those which form the great proportion of its bulk. Now, it must be sufficiently manifest, that questions involving elements of such complexity are not to be solved as rapidly or easily as the far simpler problems of mineral chemistry; and that not merely on account of their superior complexity alone, but because, in the one case, theoretical chemistry sets us far on our way towards the solution, while in the other there is still a great gap to be filled up, a whole mine of scientific facts to be worked out, before we are in the condition to approach sufficiently near the comprehension of these more complicated phenomena. In fact, the latter are not questions of *pure* chemistry, but, are intimately interwoven with vegetable physiology—so much so, indeed, that in many instances

it is scarcely possible to decide to which of these two sciences they ought strictly to belong. And it is just herein that their great difficulty consists, for there is nothing more certain than that those questions which lie, so to speak, on the confines of two sciences, require for their successful investigation a high degree of development of both the sciences on which they depend. Now, chemistry is still far from having attained all that developement of which it is capable, as the time during which it has been cultivated has not been sufficiently long to admit of much progress, except in special departments. Few of those who are not themselves chemists, are aware that the facts and doctrines of modern chemistry have been determined during the last sixty or seventy years; and that, with few exceptions, all the laborious investigations of the older chemists, and, without exception, all their general doctrines, were then swept away, to be replaced by the science as it now exists; while organic chemistry, with which agriculture is more intimately connected, has been successfully prosecuted for not more than half that period. To expect any *rapid* advances, in the practical applications of agriculture, of chemistry in its present state, is manifestly unreasonable. The progress must necessarily be slow, in some instances almost imperceptible; and much must be done which at first sight the practical agriculturist may be inclined to consider altogether foreign to his object. Extended researches will frequently be requisite which do not directly lead to practical results—that is to say, which are not immediately convertible into an equivalent of current coin, but which are the foundation of such results, and form the starting point of perhaps a very different series of experiments, having an immediate bearing upon practice. It is of great importance that this should be distinctly understood and borne in mind; for it is by no means uncommon to suppose that nothing more is necessary than at once to convert scientific facts to practical purposes; while, so far from this being the case, the agricultural chemist has a two-fold duty to perform—he must both determine the scientific facts of agriculture, and eliminate from them the practical conclusions to which they lead. It may, perhaps, be said that the establishment of these facts falls within the province of the pure chemist, and that their practical application only ought to be the province of the agricultural chemist. But if this principle were to be acted upon, the progress of chemical agriculture would be slow indeed; for the investigations of the pure chemist lead him now, and are likely for a long period to lead him, in directions very remote from those most likely to afford the materials which the agricultural chemist requires to work upon. The latter would, therefore, require to sit idly waiting till the former supplied him with facts, which his own exertions would have enabled him to ascertain. Nay, the agricultural chemist may even do a better service to agriculture, by pursuing the investigation of those apparently theoretical subjects, than by directing himself to those which seem to have the most immediate practical bearings.

There is another point on which there has been a good deal of misunderstanding between the chemist and the agriculturist, which

is intimately connected with the erroneous estimate of the extent and perfection of chemistry. It is not uncommonly supposed that the chemist is in the condition at once to solve, by the investigations of the laboratory, all such questions in practical agriculture as may happen to be submitted to him—that he can determine, when nothing else can, why certain methods of cultivation are successful, others unsuccessful. It is just possible that he may in some instances be able to do this, but far more frequently his researches enable him not to state positively what is or what is not the case, but rather to draw a probable conclusion—to form, in fact, a hypothesis, which is not in itself a truth, but which must be further tested by experiment in the field, whereby it may be either confirmed or entirely refuted. Now, very unfortunately, this hypothesis is often taken for a positive statement; and when it turns out to be erroneous, it is immediately held up as an instance of the fallacy of science by those who, not being themselves acquainted with the method of investigation by experiment, are unaware that all scientific facts are developed in such a manner. No one ever thinks of going fortuitously to work, when he proposes to determine a scientific fact. He first weighs all facts of a similar character, or having a bearing on the subject which he desires to elucidate, and then founds upon these a hypothesis, the truth or fallacy of which is to be tested by experiment.

Now, without any explanation, it has frequently happened that such hypotheses have been handed over to the practical man, whose field experiments having refuted them, he has forthwith abandoned the science which seemed to him to give erroneous results, not knowing that these results were only in progress of being arrived at by those very experiments which he was engaged in performing. The very same process has been employed in the applications of science to every other art; but the difference between them and agriculture is, that with the former, the hypothesis is formed and the experiments executed by the same person; in agriculture the hypothesis must in many instances be handed over for experimental elucidation to the practical man. The many failures which are made in other arts remain unknown to all but those by whom they have been made, while in agriculture they become known to all and sundry, and by them it is not understood that though these results are negative, they still serve to bring us all the nearer to the truth.

And this leads me to observe, that the true manner in which chemical agricnlture is to be advanced, is not merely by the exertions of the chemist or the labors of the laboratory alone. It must be by the simultaneous efforts of science and practice, each endeavoring to develop with care, steadiness and accuracy, the facts which fall within its province. Nor must each pursue its own course irrespective of the other. They must go hand in hand, and taking advantage of each other's experience, and avoiding all sorts of antagonism, they must endeavor to co-operate for the elucidation of truth. The chemist and the practical man are, in fact, in the position to give each other most important assistance. The one may point out the conclusions to which his science, so far as it has

gone, enables him to come; while the other may test these conclusions by experiment, or may be able, from his experience, at once to refute or confirm them. But it will not do to imagine that there is here either a triumph or a defeat. Such a spirit cannot be any thing but injurious. It is rather to be looked upon as a fortunate state of matters, which admitting of the examination of our conclusions from two different points of view, directs us with the greater certainty in the path of truth."

It is undeniable that chemistry is as needful to the successful investigation of the principles which underlie agriculture, as an alphabet is needful to the study of language; and this, because it is only by its aid that we can understand the elementary constitution of matter and its affinities; and it is just as true, that alone, it is insufficient to teach a great deal which we need to know in agriculture, and this, because, (not to mention other deficiencies) chemistry proper teaches nothing at all in regard to living, organized matter. What is called *organic chemistry*, full of interest and importance as it most certainly is, is merely the chemistry of substances once organized and living, but alive no longer—the mere remains of organization. Chemistry cannot so much as put her finger upon living tissues, for they die ere it reaches them. No examination whatever of these by chemistry is possible, from the very nature of the case. A skillful chemist might be able to determine the proximate constituents and the ultimate elements of which seeds are composed, but all the chemistry in the world could not enable him to determine of two seeds that one would produce an apple and the other a cabbage, nor to pronounce upon the conditions necessary to their successful development and growth.

It is the province of PHYSIOLOGY to teach the laws in accordance with which are determined and regulated the production and development, the maintenance and decay of organic bodies; under which head are included all the members of two of the great divisions in nature, viz: the vegetable kingdom and the animal kingdom. If we understand and obey these laws, we may secure abundance, symmetry, health and profit. If we disobey them, either through ignorance, carelessness or design, our wages are disease, decay, deformity and poverty.

The science of BOTANY is of use to the farmer, inasmuch as it enables him to recognize or identify plants, both those worthy of cultivation and the weeds which are troublesome or pernicious. Even

the scientific classification of plants is not without value to him, as it shows the natural relation which one species bears to another, the limits within which a certain class of experiments must necessarily be confined, and the probable fitness of food and treatment for new plants which may be introduced to his notice.

Botany, in its broader sense, is understood to include vegetable physiology, already alluded to, and the importance of which can hardly be over-estimated. Says Prof. Lindley:

"There is scarcely an operation in the art of agriculture which does not depend upon the knowledge of the phenomena which are explained by vegetable physiology; and no man can understand the principles on which he acts, unless he has made himself master of its fundamental laws. All the great improvements in the preparation of land for cropping were proposed in the first instance by vegetable physiologists; or depend essentially upon the operation of laws which they have explained. Applied, in the first instance, to gardening, and tested there, they have gradually extended themselves to the field, where their true origin has been forgotten, and men no longer remember how their improved practice came to be thought of. Draining is an example of this: its beneficial effects depend upon circumstances with which vegetable physiologists have long been familiar. The improvement of the races of plants, the preservation of purity in their propagation, the mode of manuring them, the effect of it when well or ill applied, and a thousand other things of like nature, are wholly influenced by laws which it is impossible to understand correctly in the absence of a familiarity with the principles of vegetable physiology independent of chemistry.

A person desirous of studying agriculture upon scientific principles, the only principles that are safe, requires to know the circumstances which effect the germination of seeds: why in some seasons they will not grow, while in others their success is perfect. His attention must be drawn to the conditions most favorable or unfavorable to the progress of the seedling plant, to the gradual consolidation of its parts, to the development of the wondrous organs which the Creator has given it to feed with and multiply. The circumstances most favorable to the perfect action of these organs, to the formation of the flower, the fertilization of the seed, the preservation or deterioration of the peculiar properties which skill has fixed in those artificial forms of vegetation which constitute the majority of cultivated plants, are other matters of fundamental importance, the ignorance of which degrades cultivation to the level of empiricism, and deprives agriculture of those noble attributes which have placed it, by common consent, at the head of all human occupations. They are all most important subjects of consideration with those who would study agriculture philosophically, or who expect to introduce improvements of moment into ordinary practice: for although it may be true that accident has

led to more discoveries than science, yet there can be no doubt that such discoveries would have been long anticipated, had science been consulted; and that many of the most valuable improvements in modern agriculture have either been exclusively suggested or materially assisted by physiological science."

The other branch of Physiology, viz., that relating to animals, perhaps connected somewhat with Zoology, (for what we speak of as distinct branches of science are frequently so related to, or blended with one another, that it is impossible clearly to define their dividing lines,) will do for the farmer in the case of his flocks and herds, just what vegetable physiology has been shown to be able to do in the case of plants and crops; guides him to economical practice and enables him to avoid expensive errors.

VETERINARY SCIENCE, which regards the diseases of domestic animals, is near of kin to animal physiology, and is of the very first importance wherever healthy action gives place to disease.

I might go on to mention other branches of science which it concerns the farmer to know, as, for instance, that of ENTOMOLOGY, the branch of natural history which treats of insects, and so may give us a clue to the ways and means of controlling the ravages of such as are noxious. These at times, are of the most serious character. To name but one: the apparently insignificant creature called the midge, has destroyed wheat enough in the United States, in years past, to endow perpetually, an institution of learning in every State of the Union, which should be to the agriculturist what West Point is for the soldier—or perhaps several such—for its ravages have destroyed property to the amount of scores, if not of hundreds of millions of dollars. To man, at the Creation, was given dominion over "every living creature that moveth upon the face of the earth." Man has more signally failed to assert that dominion over the insect tribes, than over any other, and he will never approach success in asserting it, until thoroughly conversant with their natural history and habits. But enough has already been brought to view, to show that the complete mastery of all the principles by which agricultural practice should be guided and directed, is a most herculean task, and fitter for the work of a life-time, than for a few brief years of preparation for active employment upon a farm; and the question naturally arises, cannot a man be a good farmer, without such extensive knowledge? If he cannot, agriculture would

seem to be the most hopeless of all human callings; whereas we know it was not only the first occupation of man, but that millions of men, during many centuries before these sciences had so much as a name, sowed and reaped and gathered into barns, and were fed from the fruit of their labors. It may also be asked, if any special education in particular branches of science would be of real benefit to the farmer, why has not the demand produced the supply? Why a system of agricultural education has not long ago grown up to supply the necessity? It may help us here, to consider the history and position of agriculture compared with other arts. The *art* of agriculture is a great deal older than its own philosophy, and during very many centuries, practice was gradually improving, very slowly indeed, and perhaps scarcely perceptible from one generation to another, but still on the whole, gaining something from experience and observation, until at last, when science was born, she had an immense labor to perform before she could catch up with the then existing condition of the art, and explain fully the why and the wherefore of what was already known of successful practice. On some points science has not only done this, but has shot far ahead of practice, and can in these respects, teach improved methods. Upon others, it is doubtful if such is yet the case, but no doubt exists that she can and will do so.

With many other pursuits with which agriculture has had to compete in these latter times, the case is far different: instead of beginning with centuries of practice, during which men's wits were sharpened by the necessity of having food to eat, these were born of science itself, and the same science which gave them birth, has steadily nurtured and watched over and strengthened them. Men engaged in these occupations, sit down at the very outset to study the principles involved; while with agriculture, its practice to this day, with the great mass of farmers, is so thoroughly empirical that science is scarcely yet recognized as having any legitimate connexion with it, and it is manifestly unreasonable to expect that a system of agricultural education would grow up until the necessity for it was felt.

On the other point, viz., the hopelessness of acquiring complete scientific knowledge, it may suffice to say, that no one contends that the farmer must obtain a perfect mastery of all the sciences which

have been named before he may venture upon the practice of agriculture. What we argue for, is, that he should obtain such a degree of elementary acquaintance with the sciences related to his calling as will enable him to avoid gross errors, to detect plausible humbugs, to improve upon what is merely traditional and empirical in practice, and, more than all, to qualify himself for prosecuting inquiries and investigations as opportunity may arise, to put himself into a teachable attitude, and to profit by the researches and discoveries of the men who devote their whole lives to the prosecution of the several branches of science; and this, it is believed, is something which is practicable; and whenever the necessity for it is generally felt, the means of securing it will be provided as soon as methods shown to be feasible are presented.

Regarding the preferable method by which agricultural education may be secured among us, I do not feel prepared to speak with positiveness. Agricultural Schools are numerous in Europe and they include great variety both as to the courses of study and the methods of instruction employed, but none of them seem exactly adapted to the wants and genius of our people. Institutions have also been established in this country from which the happiest results may be confidently anticipated, but they are of too recent a date to be cited as absolute proof. Until more fully advised regarding a distinct institution for teaching agriculture, I would incline to favor the introduction of the study of natural science into all schools now existing of a grade high enough to warrant such an introduction;—the extent and thoroughness of the instruction to vary according to the grade of the school. To the more advanced classes in our district schools enough might be imparted to draw attention to its importance, and to awaken an interest regarding the wonderful objects and operations of nature by which the pupils are daily surrounded, and to excite the desire for further knowledge. The introduction of these studies into our common schools would be a recognition of their value and importance, and a generation would soon grow up, imbued with new and enlarged views and realizing the necessity of such education as their fathers never did.

But it is to our high schools, academies and other seminaries of learning, whence the instruction is to be looked for, which is more fully to meet this great want; and these, with qualified instructors and suitable apparatus might accomplish great good.

The movement now making in connection with the Maine State Seminary at Lewiston is of the character indicated. Its aim is to enlarge very materially the facilities already secured for imparting to young men who may desire it, such a scientific training as shall best prepare them for the successful pursuit of agriculture, and it is hoped, that not only may this be carried into effect, but that all similar institutions may do likewise.

With regard to our Colleges, it is believed that however well they may have met the requirements of the times when they were instituted, few of them, if any, have *sufficiently* modified their course of instruction to retain *equal* adaptation to present educational wants, now that so great changes have since passed upon men and things.

The time was, when there were abundant and satisfactory reasons why classical studies should occupy the prominent position and demand the large proportion of the term of study which was accorded to them. In a word, experience had proved their utility and so it was fitting and proper;—and it would be as erroneous as it would be illjudged and unnecessary, to depreciate the benefits which may accrue to the scholar from their pursuit at the present day, some of which can hardly be secured by any other method. But at the same time it is to be remembered, that changes of great magnitude have taken place; great enlargements of the boundaries of knowledge have been made; new interests have arisen, and these, as well as pursuits formerly carried on in a purely empirical manner, like agriculture for example, now see the importance of scientific research, and demand both the further prosecution of its investigations and the diffusion of so much scientific knowledge as has been already acquired and possesses a practical bearing on their business. Science now asks for the prominence formerly given to the classics, and for the same reason, to wit—experience has proved its utility and its adaptation to the wants of the age. The day has passed when the dead languages may hold undisputed supremacy in College halls. In due proportion with other subjects, according to the relative importance of each, long may they hold the place they justly merit. We would not discard the old to introduce the new. The aim is not to supercede but to re-arrange; and if possible to enlarge the sphere of education. Without interfering with other fields, Natural Science presents a peculiar field of its own; new, rich and varied,

which cannot be cultivated even imperfectly without yielding valuable fruit.

The assistance which the State at present renders towards the advancement of agriculture is essentially of an educational character. She encourages Agricultural Societies which draw forth and exhibit improved breeds of animals, improved implements of husbandry and hold them up for imitation and for instruction. They also encourage improved methods of cultivation by offering inducements of honor and profit, in the premiums awarded therefor. By these means knowledge is diffused as well as emulation excited.

The sessions of the Board of Agriculture are intended to subserve the same end, by bringing together a body of men supposed to be most deeply interested in its progress, by their discussions of the ways and means of securing advance and by the interchange of views and experience. The power of the press is also enlisted, and contributes by scattering abroad over the State its annual reports.

These means, although they are intended and adapted to operate chiefly upon adults already actively engaged in agricultural pursuits, and include no direct instrumentalities for imparting instruction to the young, are not without considerable efficacy, and they may serve a preliminary and necessary purpose by the introduction among all classes, of such enlarged and enlightened views regarding methods or institutions for promoting agricultural education, as shall, in due time, lead to their adoption or establishment. One is sometimes tempted to wonder that its necessity has not been sooner felt, and the want supplied. Even an old Roman writer, amid the martial condition of a proud and heathenish empire, had the sagacity to perceive its paramount importance and the honesty to utter his astonishment at its neglect.—"Nothing equals my surprise," says he "when I consider that while those who desire to learn to speak well, select an orator whose eloquence may serve them as a model; while those who are anxious to dance or to become good musicians employ a dancing or music master; in short that while every one looks for the best master in order to make the best progress under his instructions, the most important pursuit next to that of wisdom, has neither pupils nor teachers. I have seen schools established for teaching rhetoric, geometry, music, dancing, &c., but I have never seen a master to teach agriculture nor a pupil to learn it."

To the question, which in one form or other, has so often been propounded for solution at the sessions of our Board, viz: "What further means can be adopted for the promotion of agriculture?" a very brief and comprehensive answer might be given. Educate the farmer. His education it is true, may never be *finished* at any school of man's making, but the youth may, at least, be taught to appreciate the value and to feel the necessity of a knowledge of the principles which alone can safely guide his practice. He may be taught *how to commence study*, so that, afterwards, while his bodily powers are engaged in daily toil in the great laboratory of nature whence his support is derived, he may, with only the aid of his own trained and developed faculties, mentally prosecute scientific investigations which will yield both profit and satisfaction.

The diffusion of knowledge is the only practicable method of securing progress; says the celebrated Robert Hall, "all attempts to urge men forward, even in the right path, beyond the measure of their light, are impracticable if they were lawful, and unlawful if they were practicable. Augment their light, conciliate their affections and they will follow of their own accord."

It is hopeless to attempt the extension of improved methods of practice in agriculture until farmers either feel their necessity, or in some good degree apprehend the grounds upon which they are presented and the reasons which exist why beneficial results may be anticipated. It is safe to predict that agriculture will advance just in proportion to the intelligence of those engaged in it.

S. L. GOODALE,

Secretary of the Board of Agriculture.

JANUARY, 4th, 1860.

APPENDIX.

COMPILED FROM RETURNS OF AGRICULTURAL SOCIETIES,

For the year ending first Wednesday in December, 1859.

Societies.	Received from the State.	Am't received from members, and donations.	Am't received from all other sources.	Whole amount of receipts for the year.	Am't of premiums and gratuities offered.	Am't of premiums, &c., awarded.	Current expenses of the Society.	Whole amount of the disbursements.	Value of real estate.	Value of other property.	Liabilities.
Androscoggin County,	300 00	702 00	540 00	1542 00	755 00	580 00	325 00	905 00	9000 00	–	6500 00
Cumberland County,	300 00	150 50	326 17	883 67	729 00	462 75	589 15	1051 90	–	680 59	–
East Somerset,	150 00	161 00	120 20	431 20	240 00	205 25	93 60	299 44	1200 00	–	712 69
Franklin County,	200 00	26 00	532 89	758 89	466 60	293 00	220 00	758 00	1100 00	–	700 00
Hancock County,	300 00	229 00	1469 00	1998 00	539 00	375 00	200 00	1998 00	1400 00	–	–
Kennebec County,	150 00	100 00	356 00	606 00	360 00	310 00	209 00	519 00	–	350 00	130 00
Lincoln County,	272 65	159 00	210 15	641 80	325 60	297 00	350 00	647 00	–	50 00	5 00
North Aroostook,	200 00	30 00	175 00	405 00	161 00	147 70	25 50	173 20	–	25 00	–
North Franklin,	200 00	–	170 55	370 55	490 00	286 00	339 54	466 24	–	–	–
North Kennebec,	150 00	288 00	258 44	696 44	370 00	304 00	150 00	–	2500 00	100 00	1000 00
North Penobscot,	88 56	57 65	71 72	217 93	150 00	127 30	70 30	197 60	–	–	–
North Somerset,	150 00	16 00	135 00	301 00	210 00	175 00	243 00	–	–	–	–
Oxford County,	200 00	5 00	605 81	810 81	360 00	319 00	84 00	503 00	1080 00	220 00	647 00
Penobscot and Aroostook Union,	99 50	82 00	78 50	260 00	200 00	172 00	79 00	241 00	–	–	–
Piscataquis County,	123 74	80 00	20 00	223 74	155 18	155 18	87 23	242 41	–	–	–
Sagadahoc County,	300 00	426 00	586 00	1312 00	546 00	425 00	175 00	1154 00	3800 00	62 00	2882 00
Somerset Central,	150 00	–	496 00	646 00	700 00	435 00	97 50	797 50	2500 00	50 00	1000 00
Waldo County,	236 11	144 00	111 69	491 80	274 00	215 92	136 28	352 20	–	–	58 00
Washington County,	300 00	23 00	319 89	642 89	524 00	326 37	–	631 93	–	–	–
West Oxford,	200 00	26 00	465 40	691 40	295 00	239 00	259 00	229 00	1200 00	25 00	225 00
West Penobscot,	150 00	29 04	174 00	353 04	384 00	245 00	30 00	275 00	–	–	–
West Somerset,	150 00	57 00	103 25	310 25	159 25	166 00	40 92	194 00	–	–	–
West Washington,	–	160 60	50 40	211 00	143 00	88 40	40 00	128 40	–	–	–
York County,	300 00	101 00	504 00	905 00	550 00	443 00	200 00	643 00	2000 00	25 00	1500 00

Societies.	Am't awarded for bulls.	Am't awarded for working oxen.	Am't awarded for milch cows.	Am't awarded for heifers and calves.	Am't awarded for fat cattle.	Am't awarded for horses.	Am't awarded for swine.	Am't awarded for sheep.	Am't awarded for poultry.	Am't awarded for all other live stock.	Total amount offered for live stock.	Total amount awarded for live stock.
Androscoggin County,	45 50	75 00	20 00	24 00	3 00	24 00	6 50	2 50	–	38 00	354 00	236 00
Cumberland County,	39 00	35 00	35 00	15 00	7 00	58 00	23 00	15 00	5 00	49 00	305 00	281 00
East Somerset,	12 25	17 25	6 25	21 00	–	45 25	4 50	7 50	–	21 00	134 00	135 50
Franklin County,	16 50	61 00	8 00	16 75	4 00	59 50	1 50	13 75	2 50	–	274 25	183 50
Hancock County,	10 50	30 00	7 50	11 90	–	20 50	4 00	13 00	6 00	11 50	123 00	114 00
Kennebec County,	23 00	83 00	16 00	14 50	6 00	73 25	11 25	8 00	–	–	255 00	235 00
Lincoln County,	11 50	21 25	11 00	6 50	7 00	31 75	11 00	6 50	2 00	17 00	147 00	125 00
North Aroostook,	6 25	27 50	25 00	4 00	–	13 75	4 00	2 50	–	5 50	92 00	88 00
North Franklin,	14 50	7 00	7 50	6 50	7 00	23 00	2 00	15 75	3 85	11 95	200 00	138 00
North Kennebec,	9 50	45 00	11 00	5 00	1 50	137 00	4 50	14 00	3 00	4 00	264 00	234 00
North Penobscot,	9 50	14 00	6 00	8 00	–	20 50	–	4 00	–	11 00	76 00	76 00
North Somerset,	7 20	32 00	7 50	7 85	–	23 95	3 25	5 50	–	15 00	140 00	102 00
Oxford County,	19 00	25 00	12 00	7 50	–	57 00	11 00	6 00	–	31 00	162 00	168 00
Penobscot and Aroostook Union,	4 75	4 50	4 50	4 00	–	17 00	5 00	3 00	–	–	93 25	77 50
Piscataquis County,	28 00	27 00	6 00	2 00	–	17 00	2 00	10 00	–	5 00	149 00	99 00
Sagadahoc County,	12 00	10 00	32 00	23 75	12 00	22 50	10 50	5 50	5 00	48 25	240 00	181 50
Somerset Central,	21 25	55 00	10 50	11 00	5 00	110 25	11 50	6 50	5 00	18 00	400 00	254 00
Waldo County,	9 00	37 00	8 00	8 00	5 00	22 00	10 00	5 00	–	4 00	152 00	108 00
Washington County,	12 50	17 00	–	32 00	–	26 00	–	–	–	15 00	162 00	103 00
West Oxford,	11 00	6 00	3 00	5 00	8 00	61 00	–	6 00	–	–	134 00	129 00
West Penobscot,	25 00	9 50	5 25	12 00	–	46 75	11 00	12 50	–	19 25	220 00	141 00
West Somerset,	11 25	16 60	12 00	9 50	–	15 75	7 50	13 25	–	50 25	153 75	138 50
West Washington,	7 00	3 00	1 50	–	–	16 00	4 50	5 00	–	12 00	66 00	52 50
York County,	14 00	16 00	8 00	9 00	10 00	17 00	15 00	8 00	9 00	29 00	–	–

Societies.	Am't awarded for management of farms.	Am't awarded for experiments in draining.	Experiments in subsoil and plowing.	Plowing at Exhibition.	For reclaiming meadow land.	For manures, and experiments with them.	For orchards and nurseries.	For other farm improvements.	Total offered for farm improvements.	Total awarded for farm improvements.	Am't awarded for agricultural implements.	For objects other than agricultural.
Androscoggin County,	–	–	–	8 00	–	–	–	–	–	–	17 00	90 00
Cumberland County,	–	–	–	12 00	–	–	–	–	200 00	–	15 00	77 00
East Somerset,	–	–	–	–	–	–	–	–	–	–	–	22 00
Franklin County,	–	–	–	–	–	–	–	–	–	–	8 25	76 00
Hancock County,	–	–	–	4	–	10 00	–	–	9 00	–	37 19	96 54
Kennebec County,	–	–	–	5	–	7 00	–	–	12 00	5 00	–	47 00
Lincoln County,	–	–	–	3	–	–	1 00	–	–	–	3 25	62 00
North Aroostook,	–	–	–	–	–	–	–	–	–	–	2 50	4 00
North Franklin,	–	–	–	–	–	–	–	–	–	–	3 75	52 85
North Kennebec,	–	–	–	–	–	–	–	–	–	–	–	15 00
North Penobscot,	–	–	–	–	–	–	–	–	–	–	–	–
North Somerset,	–	–	–	–	–	–	–	–	–	–	6 70	33 70
Oxford County,	–	–	–	10 00	–	–	–	–	80 00	–	9 50	60 00
Penobscot and Aroostook Union,	–	–	–	–	–	–	–	–	–	–	–	–
Piscataquis County,	–	–	–	8 00	–	–	–	–	–	–	–	3 50
Sagadahoc County,	5 00	6 00	–	14 00	–	–	–	–	91 00	25 00	3 00	109 00
Somerset Central,	–	–	–	–	–	–	–	–	35 00	–	5 00	43 75
Waldo County,	–	–	–	8 00	–	–	–	–	15 00	–	–	92 00
Washington County,	7 00	–	–	18 00	–	–	–	4 00	16 00	11 00	14 00	67 00
West Oxford,	–	–	–	11 00	–	–	–	–	–	–	1 00	–
West Penobscot,	–	–	–	2 75	–	–	–	–	–	–	–	–
York County,	–	–	–	17 00	–	–	–	–	–	–	3 00	72 00

Societies.	Amount awarded for Indian corn.	Wheat.	Rye.	Barley.	Oats.	Any other grain crop.	Grass crops.	Potatoes.	Carrots.	Beets.	Turnips.	Other root crops.	Total am't offered for grain and root crops.	Total am't awarded for grain and root crops.	Am't awarded for any other cultivated crops.	Am't awarded for fruits and flowers.	Am't awarded for honey and sugar.	Am't awarded for butter and cheese.
Androscoggin County,	6 00	6 00	3 00	1 75	3 00	–	–	3 50	1 50	50	2 00	–	54 00	32 50	5 25	8 50	3 50	22 00
Cumberland County,	12 00	10 00	–	6 00	5 00	–	–	5 00	–	–	–	–	64 00	38 00	1 00	12 00	8 00	11 00
East Somerset, . .	7 50	1 75	1 50	–	5 25	1 00	–	4 50	3 75	–	–	4 50	62 00	32 75	2 00	–	1 00	12 25
Franklin County, .	4 25	–	–	–	–	–	–	2 95	20	–	1 00	1 30	26 00	9 70	–	5 40	1 25	9 00
Hancock County, .	4 33	1 75	2 50	1 75	1 25	4 00	–	3 25	4 00	3 75	1 50	–	46 00	28 00	–	12 00	–	8 50
Kennebec County, .	5 00	4 00	–	3 00	2 00	–	–	3 00	2 00	–	–	2 00	–	–	–	5 00	–	18 00
Lincoln County, . .	13 00	6 00	3 50	1 75	1 00	2 50	–	6 00	1 50	3 00	2 25	3 00	40 00	43 00	1 50	28 00	50	28 00
North Aroostook, .	50	75	–	–	37	2 25	–	–	–	–	–	–	–	–	–	–	50	4 00
North Franklin. . .	21 75	14 00	3 50	1 00	7 00	10 75	–	9 00	–	90	2 75	4 35	113 00	75 00	–	2 90	3 40	9 25
North Kennebec, .	–	–	–	1 50	–	–	–	2 00	–	–	–	1 50	27 00	6 50	–	5 00	2 50	13 50
North Penobscot, . .	3 00	–	–	2 00	–	–	–	–	–	75	25	25	6 25	6 25	6 00	6 25	1 50	9 00
North Somerset, . .	5 25	4 50	–	3 25	6 50	–	–	4 50	75	40	1 10	1 00	35 00	29 00	–	3 20	1 40	4 90
Oxford County, . .	6 00	9 50	1 00	–	1 00	–	–	8 00	–	–	–	–	57 00	25 50	6 25	12 50	2 50	24 00
Penobscot and Aroostook Union,	4 50	2 00	–	–	–	–	–	3 50	–	–	1 00	–	37 00	11 00	–	4 00	1 00	13 50
Piscataquis County, .	8 00	–	–	5 00	–	–	–	2 00	–	–	2 00	–	28 00	17 00	–	–	–	12 00
Sagadahoc County, .	11 00	5 00	3 00	3 00	3 00	3 00	–	6 50	2 00	3 00	3 00	–	77 00	42 50	7 25	13 25	4 00	26 00
Somerset Central, .	6 00	–	–	–	–	–	–	5 00	–	–	–	3 00	150 00	14 00	–	9 00	4 50	13 00
Waldo County, . .	6 00	3 00	–	2 00	3 00	3 00	–	10 00	1 50	2 50	5 50	–	46 50	38 50	7 00	9 25	3 50	9 00
Washington County,	1 00	6 25	1 00	6 00	5 25	–	9 00	–	6 00	2 00	6 00	3 00	110 00	45 00	25 00	24 75	2 50	10 50
West Oxford, . . .	7 50	7 50	2 00	–	2 00	–	–	1 00	–	–	1 00	–	29 00	14 00	4 00	7 50	3 75	7 50
West Penobscot, . .	10 50	2 00	–	4 00	1 75	1 75	–	10 50	3 75	1 00	–	2 90	65 00	38 00	–	15 05	–	14 25
West Somerset, . .	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
West Washington, .	50	50	–	50	–	–	–	50	25	25	25	50	14 75	3 25	2 00	75	–	5 00
York County, . . .	–	–	–	4 00	4 00	–	–	–	–	–	–	–	–	–	–	21 50	5 00	17 50

NOTE —To the Schedule of Exports from Franklin County as given on pages 9–10, Mr. Dill desires the following to be added, which were accidentally omitted:

10,000 Straw Hats at 15 cts , - - -	$1,500 00
(Many of these are fine, and sell at 25 to 50 cts. each.)	
Scythes, manufactured at East Wilton, - -	15,000 00
Iron Bars, " " " - -	2,000 00
Drawing Knives and Hay Knives, - - -	1,000 00
Woolen Yarn, at Wilton, - - - -	15,000 00
Which added to the amount stated on p. 10, makes,	$562,850 00

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