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**NOTICE.**—The subscription to the *Illustrated Journal of Agriculture*, for members of Agricultural and Horticultural Societies, as well as of Farmers Clubs, in the province of Quebec, is 30c annually, provided such subscription be forwarded through the secretaries of such societies.—**EDITORIAL MATTER.** All editorial matter should be addressed to A. R. Jenner Fust, Box 109, Lachine, Que.—or to the Director of Agriculture, Quebec.

OFFICIAL PART.

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To ARTHUR R. JENNER FUST, ESQ.,  
UPPER LACHINE, QUE.

Rothamsted—St. Alban's, April 4th, 1888.

Dear Sir,—We shall publish in a very short time a paper on the assimilation of nitrogen by leguminosæ, in which we shall give a review of all the recent experiments carried out in Germany, France and elsewhere, this will be followed by our own results. If the various experiments are correctly carried out, there can be no doubt that these plants do obtain large amounts of nitrogen from atmospheric sources. As far as our own experiments are concerned, a soil or an atmospheric source would explain them equally well. Some of our experiments prove that in a soil very rich in organic nitrogen cropped continuously with leguminosæ, the reduction of the nitrogen in the soil has been very large, and this reduction has taken place principally in the surface soil. On the other hand, in ordinary soils poorer in nitrogen, the removal of

considerable quantities of nitrogen in a leguminous crop has left the top soil decidedly richer in nitrogen. The nitrogen must have come either from the atmosphere, or the subsoil. It is very unfortunate that, all over, subsoils vary so much in character and composition that analysis is almost useless. Assuming that leguminosæ do take nitrogen from the air, when grown in an artificial soil deprived of its nitrogen, we are a long way from showing that it does the same in an ordinary field. At the present moment, I think it would be advisable to keep your mind open on the subject: this is really what we do. Yours truly,  
J. B. LAWES.

Meeting of the Société d'industrie laitière.

The annual meeting of the above society was held at St. Hyacinthe on the 11th and 12th of January last. It does not seem to have been so numerously attended as usual, by the farmers, but the number of professional cheese- and butter-makers present was very great.

After the opening address of the President, the Hon. B. de la Bruère, the well-known entomologist, M. l'abbé Provancher, read a paper on the *insect- and vegetable-parasites of cheese and butter*. The Abbé charged these tiny organisms with injuring the agricultural-products of the province of Quebec to the extent of \$10,000,000 a year! Perfect cleanliness, he said, was a sure preventive against the attacks of these pests.

The report of the committee for examining the samples of butter stated that, in their opinion, butter from cream sixty-six hours old, well churned, and washed when in grain, should only be worked once. Cream slightly acid, produced butter of a higher flavour than when perfectly fresh.

M. J. C. Chapais read a paper on the general relations

subsisting between the proprietor, the manager, and the patrons of a factory.

M. l'abbé Chartier gave certain explanations with reference to the expense of cultivating an acre of mangels and an acre of fodder-corn. The Abbé affirmed and maintained that \$12 was the cost of an acre of mangels from the *braiding* of the plant to the harvesting of the crop exclusively, while Mr. Jenner Fust, in the "Journal of Agriculture," asserts that it can be done for \$3 40. (1)

The general opinion seemed to be that the cultivation of silage-corn was more profitable than the cultivation of mangels.

*Partially skimmed-cheese.*—On this most important matter, the committee of experts, having tasted the samples of whole-milk and half-skimmed milk cheese, reported: That the whole-milk cheeses of M. Archambault, of the St. Hyacinthe factory, were of the first and second quality. The half-skimmed cheeses from the combined butter and cheese factory at St. Denis, Kamouraska, were classed as of the second, third, and fourth quality. The report of the committee was unfavourable to half-skims; they were faulty in make, and did not keep.

A pretty hot discussion arose on the subject of half-skims cheese. M. M. Gérin, Vaillancourt, Bernatchez, Archambault, Gendron, Taché, Ayotte, Chartier, against them, and M. J. C. Chapais in favour of them. M. Chapais read a letter from a Gloucestershire land-owner, in favour of partial skimming after the middle of August. The cheese, this gentleman states, made by his tenants in this way, has a better flavour than that from whole-milk and brings the highest price in the market. M. Bernatchez thought that to obviate the injury that might arise to our market in England, a distinguishing mark might be placed on all cheeses of the half-skim sort. M. Chapais, on the part of the makers of this sort of cheese, accepted the suggestion. If the cheese was as bad as the buyers asserted, why did they run after it? If it did not pay them, let them refuse to buy it: the factories would then soon drop its manufacture.

M. Bernatchez, M. P. P., said that *dairy-schools* had become a necessity of the province, and as a member of the legislature he would do his best to get them established. He was strongly opposed to the combined system of making butter and cheese from the same milk, asserting that this procedure had injured the United States cheese in the market. Of all the private establishments he had visited, the farm of Mr. Ritchie, at St. Anne de la Pêrade, had given him the greatest satisfaction.

M. Lesage, the assistant commissioner of agriculture, was totally opposed to the combined system. It would be a misfortune were it to get known that, in the Province of Quebec, ever so small a quantity of cheese was made from partially skimmed milk. Such cheese as this should no longer be made, and he hoped that those who had extolled it so much, would think better of it, and abolish its manufacture, as the interests of the whole province are at stake. The factors should agree among themselves to buy no more of this cheese, the manufacture of it would then soon be given up. The products of the dairy were the mainstay of our agriculture. The Canadian cow was proved to be one of the best in the world, and, in its way, nothing could beat the Canadian pony.

*Competition of Canadian milch-cows.*—This competition was not successful this past year. Only one cow fulfilled the conditions of the trial; she made 12½ lbs. of butter in 7 days, and to her owner, M. Philéas Jérôme, of Ste. Thérèse, was

awarded the prize of fifty dollars. The competition, however, is to be continued for another year.

M. Beauchamp, M. P. P., was opposed to the combined butter and cheese factories. He thought that the Agricultural Commission would be able to assist the government and the legislature in making certain useful reforms, the nature of which will be understood when its report is published. As to the Council of Agriculture, the schools, and the agricultural societies, they were far from being perfect.

M. Frey, a young Frenchman, two years in the country, and an apprentice in a cheese-factory, read a few notes on cheese-making. He denounced the frauds practised in weighing milk, by which the maker returns less than the real weight as delivered by the patron, to make it appear that he, the maker, is more skilful than he really is, inasmuch as from 100 lbs. of milk he has produced more cheese than other makers.

M. Garrigue, another young Frenchman, thought that the best system, theoretically, for the establishment of a factory was that a number of farmers should unite, and be the proprietors themselves. But, practically, this would not answer (*I should think not.* A. R. J. F.), for there would be too many managers. That the proprietor should buy the milk from the patrons, was a proceeding he could not recommend. The proprietor should make the cheese for the patrons at a fixed price.

In reply to a question of the Abbé Gérin, Mr. Scott said that he never bought partially skimmed milk cheese.

M. Matsan, supported by M. Casavant, spoke in favour of letting cattle out of their stables every day in winter, except during a storm, and allowing them to drink at the springs. (*Ice-cold water, I presume!* A. R. J. F.)

M. l'abbé Montminy, was utterly dumbfounded at any one approving of such treatment for animals; he had always heard it condemned by the best agriculturists.

*Note.*—M. J. C. Chapais observes on this subject, that he is entirely opposed to the practice. As for me, *distinguo*; *milch-cows* should be in-doors from the 1st November to the 10th April, and their water should be of the same temperature as the stable. From about the latter date they, like hot bed plants, should be gradually *hardened off*, unless they are to be kept at home on forage-crops all the summer. *Young stock* will be none the worse for a scamper out of doors in a sheltered yard.

A. R. J. F.

The next annual meeting will be held at L'Assomption.

I am sorry to see that, except professionals, there hardly appears the name of one person of English-speaking descent in the list of members of this most useful society. *En revanche*, however, there are hardly any names of French-Canadians in the list of members of the Montreal Horticultural Society. This is really very bad. How can the country make real progress, if we do not pull more together?

ARTHUR R. JENNER FUST.

#### Barnard on Dairy Schools.

The following is a condensation of an article on dairy-schools by Mr. Ed. A. Barnard, D. A., published in the March number of the French edition of the Journal.

M. Chapais, in his address to the *Société d'industrie laitière* at St. Hyacinthe, laid especial stress on "the necessity of the proprietor of a factory possessing a thorough knowledge of his business." In our four hundred or five hundred butter and cheese factories, how many proprietors are there who possess this indispensable qualification? Have we even taken the right steps to enable them to obtain it?

(1) My friend, M. Séraphin Guèvremont, whom I taught "how to do it," is my authority for the cost. His cousin, M. Pierre Guèvremont, agrees with him. As does Mr. Tuck, who never grows less than 15 acres of roots a year.

Up to the present time, our road has been an easy one, and as long as the price of butter and cheese keeps up, everything will go on well "in this best of worlds"; but when our speculators have over-bought themselves—and many of them gamble in cheese as well as in stocks—when the English market is choked up with the millions of boxes which Canada, the States, and Europe, are preparing to send there, when the competition is at its height—and we are nearly arrived at that point—what man among us, in the province of Quebec, will be able to pronounce with certainty on the numerous problems which concern the dairy-industry, even if we take the manufacture of butter and of Cheddar-cheese alone? It will, decidedly, not be we! And yet we were the first in this province to bring this industry before the public view. (1)

During several years we were alone in studying and endeavouring to form those societies of which there is now such a number in existence. Many a long and painful journey have we undertaken for the purpose of investigating these questions, and now, after 19 years of labour, we are still at work upon them. But, in truth, this is not our business, we have other things to occupy us. Nevertheless, we can make both butter and cheese; in fact, some people are good enough to consider us an authority on these matters. Still, having never learned under a master—having only picked up the details here and there—we acknowledge our utter incompetence as an authority on these subjects.

Having made this confession, in all truth and frankness, we have, assuredly, the right to ask: Where are the competent authorities in this province? We do not hesitate to reply: There are none.

While we recognize the existence of much merit in those who are at the head of our dairy-school (??) at St. Hyacinthe, or of that (???) at N. D. de la Terrière (Chicoutimi), we believe that they would be the first to admit their *complete incompetence* as authorities on all, or even on the greater part of the matters which belong to these two combined industries. What they have learnt they teach in the best manner they can, and, for the payment they receive, we cannot ask more from them. Besides, where and how have they studied these subjects exhaustively. The same may be said of our inspectors. Observe, we do not by any means reproach the devoted men who direct these schools (??), or those who act as factory-inspectors. They do what they can. Granting their want of complete teaching, their success has been wonderful, but after all, are such men absolutely competent as authorities? And if they themselves admit the small advantages they have, up to the present, enjoyed, and their ardent desire to be put in a way to learn thoroughly all that concerns *their trade*—we are not speaking of those sciences which immediately belong to the dairy-industry, but simply *their trade* as makers of butter and cheese,—where, we ask, shall we find our authorities?

There is not much doubt but that certain pretended authorities will accuse us afresh of wishing to lay down the law on all matters connected with the dairy-industry! But if we are in the right, does it not become a subject of urgent public interest to know our weak side and to strengthen it? We will speak out: Our views have been, up to the present, time so ill interpreted by certain pretended authorities that we preferred to remain silent during the discussion at our annual meeting, in order to avoid renewing, for, probably, the tenth time, a question about an elementary subject connected with dairy matters; a question, the inquiry into which is fruitless, since its true solution, it seems to us, is hidden from our eyes, in spite of its staring us full in the face.

(1) *Préconiser*, to publish by public out-cry: from the latin *præco*, a herald. *Tas.*

To sum up, then, for the present, we affirm that, in this province we possess absolutely no authority competent to direct us in matters pertaining to this industry. The dairy-business has been, especially during the last two years, the chief means of forwarding the progress of agriculture. For our part, we are convinced that, if we do not take care, we shall soon be completely overwhelmed in the struggle that is imminent on every side to seize upon, to our loss, our only market, that of England.

We have been, for a number of years, asking for the establishment of a central school-factory, attached to a farm-school and directed by an expert perfectly competent, both in theory and in practice, to give every information required by those interested in the questions which arise in connection with the dairy-industry. Such a school should be in a condition to work both in summer and winter, that the makers of cheese and butter may come and perfect themselves in their trade, and, at the same time, study the different questions connected with the business, especially during the season when their factories are closed. No one can be in doubt as to the advantages to be derived from such an institution to agriculture as a whole. We call for the establishment of such an institution with all our heart.

In our next, we will examine the questions belonging to the fitness of the proprietor and the maker. To-day, we will only say, that, in our opinion, the proprietor should himself be a first-class operator.

(From the French.)

ED. A. BARNARD.

*Butter.*—Mr. Vallancey Fuller says that our Canadian butter ought to be as good as the Swedish, but it is not, and never will be until the cows are better fed; the atmosphere of the stables, &c., kept purer; the mixture of the creams of different ages and colours better looked after; until, to put his argument in few words, the butter-makers know something about their business. If they did, we should not see on our tables such mal-odorous, mottled rubbish. No wonder our butter, says Mr Fuller—and observe he is speaking of Ontario as well as of Quebec—is more and more falling into disrepute in the English market, while that of Sweden is fetching the highest possible prices. A. R. J. F.

#### DE OMNIBUS REBUS.

Box 109, Upper Lachine—March 19th, 1888.

*Harbingers of Spring.*—Crows have been seen arriving, people say, from the south; but I fancy they are some of the crowd that always winter in the bush on the Mountain. To-day, my eyes were gladdened with the sight of three black-ducks, flying from the West, and swooping down with wing-flapping delight into the lake, about five hundred yards above the Lachine station. I think these birds must be trustworthy heralds of the approach of our short but pleasant season of spring. Conceive a good old-fashioned early seed-time again! When I first came to the country, nearly thirty years ago, I found the Chambly people sowing pease on the side-hills in March! If an early spring does come, I advise all my readers to pitch into their work at once. Get your seed in—wheat, oats, barley, and pease—a good depth, and believe me no subsequent frosts will damage the braird. Of corn, I advise just the contrary: never plant corn until the ground is perceptibly warm and there is a fair prospect of fine weather. May 20th is a good time in this part of the province. I hope this number of the Journal will be in the hands of my readers at an early date, as I have written a good many notes for it, some of which may, if they will allow me to say so, prove worthy of attention.

*Ensilage.*—According to many writers on this subject, a cubic-foot of ensilage weighs 50 pounds; Mr. Barnard, if I remember rightly, puts it at 40 pounds; and Mr. Voelker, whose experiments at Woburn my readers have seen reported, calls it, from actual measurement and weighing, 24 pounds! A vast discrepancy between the three, which can partly be accounted for by Mr. Voelker's stuff being meadow-grass, and that of Mr. Barnard and the others being corn.

The general opinion seems to be decidedly in favour of nearly ripe corn for the silo. Mr. Brown, of New-Hampshire, says: "Corn must arrive at a certain degree of maturity before cutting, if the best silage is to be produced," and a dozen others hold the same view, particularly Mr. Hazen, his neighbour, who ensiled 889 tons, the produce of 50 acres, last season! A dairyman, of course, is Mr. Hazen, and on a large scale, I should think.

We must not forget that, though corn sown thickly and cut green takes but little out of the ground, it is a very different matter when the seed is allowed to form and nearly ripen.

Some farrow-cows were fattened, on an ensilage diet alone, by an extensive farmer near the White-Mountains, and the beef was pronounced first class by a cook who had been employed at the Fifth Avenue Hotel, New-York, and other first-class houses. He said he had never cut any finer beef in any place where he had been employed. It may be so, but if the New-York people do not know better than to call the meat of farrow cows fine beef, I cannot estimate the opinion of this cook very highly. In England all the bulls go to the convict-prisons, and the farrow-cows to the troops and the manufacturing towns; though a heifer after her first calf is good enough for most people; yet so great is the power of prejudice, that if a butcher were known to buy one for slaughtering, he would infallibly lose all his best customers. He must kill nothing but steers and maiden-heifers, if he wants to keep in with the better class of people.

One writer in the Country Gentleman states that his cattle are fed on one-third silage, one-third salt-hay, and one-third steamed *cummins* or malt-sprouts. A curious ration enough, but fed on it, his working-bullocks—yoked every day—will be fat enough for the butcher by spring. I do not take it the butcher will find much internal fat when he comes to open them. The mixture has a nutritive ratio of 1:7.2, and contains only 1% of fat. The addition of a couple of pounds of crushed linseed a head a day, would make a considerable difference in the feeding properties of the ration. Salt-hay is, I presume, hay cut off the marshes on the borders of the sea, and if it resembles what I have seen in England, on the Essex coast, it is at best but poor stuff; in fact, the writer says that his cattle would hardly eat it until he bethought him of mixing silage with it.

*Canadian Cattle.*—The importation of store-stock into the North of Scotland, from Canada, has not been a paying venture in either of the two seasons in which it has been tried. But it so nearly paid its way last year, that the speculation is to be tried again. As the cost of carriage of lean and of fat beasts is about the same, surely it would pay the Canadian farmer better to send over his beasts in a completed form than in a lean state! However, there may be something to be said on the other side of the question.

*Lawes again.*—The debt farmers owe to Sir John Lawes is enormous in amount, and is spread over a vast extent of the civilized world. People in every country are opening their eyes to the fallacies that he, with his indefatigable adjutant, Dr. Gilbert, has exposed, and are absorbing, with earnest attention the truths that he has, for the last half-cen-

tury, been teaching. For example, I was delighted to see the following passage, in answer to a correspondent, in the Country Gentleman. "The analysis of any plant would not be likely to show what manure should be applied to produce a crop of that plant, as the ingredients which crops are found to contain largely do not always, or even often, show that those ingredients in manures are the best suited to their growth. Thus, although turnips are found to contain a large amount of potash, and less than some other crops of phosphoric acid, repeated experiments have shown that the crop is more benefited by superphosphate than other crops of different composition." Of course, this is a thorough following in the steps of the great teacher of Rothamsted, and it is very much to be desired that the gentleman who wrote the above passage would find it convenient to read some of the perverse letters sent to the agricultural papers of the United States before publication, and add such annotation to them as may show the readers of these publications the absurdity of too many of their positions.

*Russian apples.*—It is really quite refreshing to turn to Dr. Hoskins' articles in the Rural Vermonter. He, at least, never talks nonsense, and though I do not always agree with his dicta, still his good, sound reasoning invariably gives one a certain degree of respect for his most, at first sight, surprising statements. Lately, Dr. Hoskins has been growing the famous Russian apples, and I think our people ought to know that he does not by any means feel satisfied that they are, what they are asserted to be, *iron-clad* in the climate of Vermont, the temperature of that State being, I believe, pretty much the same as the temperature of the province of Quebec. "It seems," says he, "that all the Russian apples are generally supposed to be able to resist any climate in the United States, if not in Canada. This, however, is far from being the fact. *Red Astrachan* has long since proved itself to be no hardier than the *Tolman Sweet*, less hardy than *Ben Davis*, and not nearly so hardy as the *Fameuse*. On Lake Memphremagog, the *Fameuse* can be grown quite successfully, and *Ben Davis* will grow, and bear a good many apples, but our test winters wipe it out. My greatest disappointment, however, in regard to the Russian apples, is that most of the long keepers seem lacking in hardiness. *Borsdoff* (No. 341) is not any nearer an iron-clad than *Fameuse*; while *Bogdanoff*, a highly praised winter apple of the Budd-Gibb importation is quite as tender as *Ben Davis*. *Babuschino* (469) is another that shows tenderness, much to my regret, as it is highly praised for quality and keeping by Mr. Gibb. But my greatest disappointment is in *Longfield*. I have this from three sources, all seemingly alike in trees (though none have fruited), and they are all killed back in the nursery and orchard, fully as much as *Fameuse*, and became blackhearted. It is exceedingly disappointing, in our dearth of iron-clad long-keepers, to find that of the few Russians reported to be keepers so many should fail in this point."

Dr. Hoskins' reputation as an orchardist, pomologist, or whatever the last new term may be—we used to call them fruit-growers in my day—is so high in the estimation of our people, that I am sure it will be unnecessary for me to do more than call attention to these remarks of his.

*Draught of ploughs.*—Somewhere about the year 1848, I remember very well the astonishment that pervaded the minds of the more advanced portion of the farmers of England on hearing that, at the experiment on the draught of ploughs tried at Lord Ducio's Example Farm, near Dursley, Gloucestershire, the dynamometer, then used for the first time for purposes of the test in public, proved that the draught of the

modern two wheeled plough of Ransome and Sims, of Ipswich, was far less fatiguing to the horses than drew it than the best specimens of the Scotch iron swing-plough, which, up to that time, had been considered not only the most perfect implement of the kind as far as its capability of cutting out and laying in a correct shape an ordinary furrow went, but also the plough that took less out of the horses than any of its almost innumerable rivals. Wheels had always been scoffed at by all farmers, except those who had been accustomed to the old Kentish "Turnwrest" plough, and the Berkshire two wheeled plough, both of them ancient importations from Normandy or Brittany, where cumbersome machines not unlike those I have mentioned may still be seen at work, in fact I have before me an engraving of a picture exhibited at the Paris Salon in 1882, painted by Mr. F. A. Bridgman, a young American who, from his name, ought to be a far away cousin of mine; and in this picture "La Plantation du Coza"—the transplanting of coza or rape, for seed purposes—is a really exquisitely drawn representation of the two wheeled plough, with its heavy beam resting on a gallows, and drawn by three powerful Norman horses, harnessed abreast.

Well, the Scotch ploughmen, who had earned extra wages as being the only men capable of holding a swing plough properly, were horribly disgusted at the success of the wheel plough, and with reason; for, whereas a farmer who was accustomed to keep five ploughs at work had been obliged to hire and pay high wages to five good men, if he wanted his work well done, he found that now he could do with one skilled ploughman and four strong lads, which would make a difference of some sixteen or eighteen shillings a week in his wages account. These two wheel modern ploughs, being once set to turn a furrow of any desired depth and width, would go on doing their appointed duty, without that duty depending in the least degree on the skill of the holder: when the head ploughman had set the wheels right at the beginning of the job, unless the lad in charge of the plough played some trick with it, the furrows, one after another, were faultlessly turned. Any alteration, I need not tell my practical readers, would be immediately detected by the want of equality and the position of the furrows where the change began.

I have been led to set down these notes by a report, by Professor Sanborn, on "the draught of ploughs as tested by the dynamometer." The report is a very exhaustive one, but it is one, amongst a thousand other instances, of the little effect the painful experiments which have been carried on for so many years—more than 45—under the watchful superintendance of the Royal Agricultural Society of England, have had on the minds of the agricultural teachers of this continent. If I were to suggest an object for his study to a young professor in the science, I should advise him to imbue his mind thoroughly with the contents of the forty-five volumes of the Journal of the Society just named. Many of the practices therein described are, I am well aware, quite unsuited to our pockets, our climate and our soils; but, the principles involved in any science are true under any sky, and as the food and growth of plants and animals are the same in England as they are in Canada, so the means of producing their food and growth must be the same. It may pay better here to grow corn than to grow roots, but the same processes and the same supplies of food that will grow roots in England are required for their production here. For the last twenty years—so the keeper of the library of the Natal History Society of Montreal tells me—a number of volumes of the Journal I speak of have been lying in the dusty recesses of a room in their building, and, with the exception of myself, no one has had the curiosity to open one of them!

But I have got a long way from Professor Sanborn on the use of the wheel-plough.

"The use of the wheel under the end of the plough-beam," says Mr. Sanborn, "is an old practice, now nearly out of use. The leading dealers at Columbia did not understand me when I inquired for a plough with a wheel on it, and consequently I had to get one made for the trial to be related." From theoretical principles, wheels have been declared useless, and Scotchmen, whom none excel with the plough, declare wheels to be an injury to the ploughman, who, depending upon them to regulate depth, soon overlooks their adjustment." As I have already pointed out, this is not the real reason for the objection. One great advantage of the wheels, or even of one wheel, is that, as the ploughman has not to regulate the depth of the furrow by raising or depressing the stilts, he is deprived of all excuse for leaning on them. How often have I seen a tall, lazy fellow, with a swing plough, towards the end of a "yoking," making the horses draw a good part of his weight. Even Stephen, the author of *The Book of the Farm*, with all his love for the East Lothian or Small's plough, is obliged to confess, "that nothing can exceed the beauty of the work done by the English ploughmen with their wheel-ploughs." However, he need not go far a field to see that kind of work, as there are plenty of wheel-ploughs, from Howard's, Ransome's, and other factories, now-a-days in Scotland itself. I saw, last May, at the Ottawa Experimental Farm, several ploughs at work with a skim-coulter and a wheel to each, and very well they were behaving.

The following tests are with the "Oliver chilled plough," I do not profess to understand the advantage of a furrow twice as broad as it is deep, except in stirring fallows, and for that work I prefer a grubber.

	Width of furrow.	Depth of furrow.	Square inches turned.	Draft.	Draft per sq. inch.
	in.	in.	in.	lbs.	lbs.
No. 1 truck on.....	16 4	7 55	123 82	541	4 37
	16 9	7 7	130 13	484	3 72
	15 6	8 2	127 92	512	4 00
Average.....	16 30	7 81	127 30	512 33	4 03
No. 1 wheel off.....	16 3	8 2	133 66	625	4 71
No. 2 wheel on.....	15 1	8 35	126 08	578	4 58
No. 2 wheel off.....	15 4	8 7	133 98	671	5 01
Plow No. 3	11 33	7 71	87 35	500	6 00
wheel on.....	11 71	7 08	79 08		
Plow No. 3	14 4	7 03	82 35	522	6 95
wheel off.....	12 2	6 75	87 35	624	
Average draft with wheel on.....					4 37
Average draft with wheel off.....					5 56
Per cent. of draft saved by wheel.....					14 1

"Here is a startling gain from a discarded and very simple practice. The reason for such a result was clearly discerned and visible to all Professor Sanborn's students. The bottom of the furrow was much smoother where the truck was used and the plow easier to hold."

Professor Sanborn uses what he calls a *truck*, a thickish bar of iron, I suppose, taking the place of a wheel, but the latter must act more smoothly.

The professor's remarks about harnessing horses for ploughing are, in the main, judicious, but I must take exception to the following:

"I do not approve of sustaining the traces by a strap over the loins of the horse to hold them from the ground when turning at the ends of the furrow, in order to prevent the horse stepping on them."



If my readers will look at the accompanying sketch of a plough at work, they will see at once that there is no injurious angle formed, such as Mr. Sanborn blames, but "the two hooks support the chain-traces, just below the exact line of draught; if above that line the force of the draught would be thrown as a strain upon the groins of the horse, by means of the back-band." See Stephen's *Book of the Farm*, page 158, vol. I, ed. 1850.

Let any one compare the sole of two furrows, the one cut with a wheel-plough and the other with a swing plough, and he will not long hesitate as to which of the two implements he should assign preference.

Experiments were also tried with coulter less ploughs, and the draught was shown to be less than when a coulter was used. The favourite furrow seems to have been one 7 x 14 inches, but as the draught of this required three horses, = to 450 pounds—I presume it would only be done in cool weather: the middle horse suffers dreadfully in hot weather,



A SCOTCH PLOUGH AT WORK.

as the Omnibus proprietors found in 1830, when they tried that style of team. In London, they soon fell back upon the pair, though in Paris, I believe, three horses are still used abreast. "All the three factors discussed, the truck or wheel, the coulter, and the width and depth, make a saving of 49.7 per cent.; or, to put it in another way, a plough with wheel on, coulter off, and ploughing a good-sized furrow, will give this percentage of gain when put against a plough with coulter and wheel off, and turning a shallow narrow furrow."

What shall we say about this question of furrow width? How, I ask are the harrows to get hold of land when the furrows are laid over as flat as Mr. Sanborn recommends? Mr. Lunan, of Sorel, one of the best farmers I have met with in this province, aims, he told me last year, at making his man hold the plough, in stubble-land, 8 x 9 inches, I believe in 7 x 10, or 8 x 11, and here comes Professor Sanborn with his three horses and his 7 x 14 inch furrow. We cannot all three be right! I grant the professor that the absolute draught in a 7 x 14 inch furrow is less than in a 7 x 10-inch, because the dynamometer says so, but is minute subdivision to go for nothing? Is the complete pulverisation of the land secured by the use of the digging fork no better than the lumpiness of a spade dug plot?

A. R. J. F.

In the following extract, C. S. makes the usual mistake which Lawes and Gilbert have done so much to correct. He evidently thinks that an analysis showing the constituents of a plant is enough to show what manures should be applied to the soil to grow a crop of that plant. Professor Robert's caution is, as almost everything he says in public is, full of sound sense.

(Answer by Prof. I. P. ROBERTS of Cornell.)

C. S. asks—Is the phosphoric acid in South Carolina rock worth as much as the same in fresh animal bone, and if not, why not? Also how much plant food is carried off the land by one ton of various kinds of crops?

The phosphoric acid in South Carolina rock untreated with sulphuric acid is not worth as much as that found in bones, because it is almost insoluble in the soil, even though

it is ground fine; while fine ground bone soon gives up to the soil its phosphoric acid. Phosphoric acid made soluble by being treated with sulphuric acid is just as valuable when procured from rock as when procured from bones.

The plant food carried off by the removal of one ton of the crops named below is as follows:

	Nitrogen. lbs.	Potash. lbs.	Phos. Acid. lbs.
Timothy.....	31.0	40.8	14.4
Clover.....	40.1	36.6	11.2
Wheat.....	41.6	10.6	15.8
Oats.....	38.4	8.8	12.4
Wheat straw.....	9.6	12.6	4.4
Oat straw.....	11.2	17.8	3.8
Potatoes ..	6.8	11.4	3.2

C. S. says: "If I knew just how much of each element was required to grow a crop, I think I could use commercial manures with more profit." That may be so; but remember that you have another problem to solve, for you must know what is in the soil and available, as well as what is removed from the soil. Here, the chemist can give you but little or no assistance. The farm, your farm, is the place where this knowledge is to be gained. There is no use of dodging these questions any longer. The complex and more difficult problems must be attacked by the experiment stations, while the simpler and local ones must be solved by every farmer on his own farm.

Treat one plant to phosphate, another to potash, another to nitrogen; then mix two or three elements of plant food together in varying quantity, and then find out what kind and quantities of the elements desired are present, and what deficient.

It is a great thing to have got an agricultural chemist to see that, beyond a certain point, nothing but experimental practice can guide the farm. I fancy Vile was the first to confess that in this, as well as in numberless other cases, Lawes and Gilbert had been right from the beginning. The whole foundation of their teaching rests upon this, and, I am very glad to see how very generally the principle is being carried out.

I am only sorry that Professor Roberts did not add our *apuite* to the Carolina Rock, in speaking of its indissolubility. I hear a new method of utilising the former is about to be brought forward: what it is I do not yet know, but I shall look sharply after it when it makes its appearance, and if it is worth any thing I will let my readers know, if not—

*Wheat.*—The average crop of wheat in England for the year 1887, was thirty-two bushels an acre, and the price four shillings and four pence a bushel; equal to thirty-four dollars an acre. The crop of the United States yielded ten and a-half bushels, at an average price of, say eighty cents a bushel, equal to eight dollars, fifty cents. Thus the value of an acre of wheat in England exceeded the value of an acre of wheat in the States by twenty-five dollars, fifty cents; or, in other words was just four times as valuable. I do not think the English farmer is falling back in his cultivation of the wheat crop, and I fear that, low as is the price, it will be some time before he feels much anxiety to invest his capital in the purchase of the worn-out farms of the New-England States.

#### FRUIT.

*Champion grape.*—Mr. Pattison, the most successful grape-grower of the province, still holds the opinion that the Champion is the most profitable grape to grow. At his place, Clarenceville, E. T., the vines frequently yield as much as

forty pounds a piece. Ho thins out of all the imperfect berries, and sends the fruit to St. John's. Thinning out helps ripening, and by getting them to market early, Mr. Pattison sells a large proportion of his crop for ten cents a pound. Now, later in the season, I know of Agawam, and other superior qualities, from Châteauguay, that sold for three cents a pound. Though the less said about the quality of the Champion the better, it certainly is the most suitable grape for this province. Of course, all hope of making fortunes out of this most uncertain crop, the grape, is banished from men's minds.

**Cherries.**—Cherries, too, do not seem to be looked upon with much favour. Birds destroy the crop—when there is one.—Black-knot plays the very mischief with the wood, and out of fifty trees, Mr. Shepherd says he does not get enough for his own use. In Keut, we use mechanical means of keeping the birds off. Clappers, or rattles, kept in motion by the wind, fail to deter the robbers when the wind drops. Bits of bright tin, hung near the limits, do a little good as long as their effects last, but, unfortunately, the birds soon get used to them. If Mr. Gibb's *duarf-trees* from Russia turn out well, nets can be spread over them and the birds will be circumvented, but would not dwarf trees be a good deal in danger of injury from our great depth of snow?

**Plums**—Moore's Arctic seems to be growing in favour. Mr. Brodie, of Montreal, takes no trouble about his plums: when the old trees die, he takes them up, and allows seedlings to take their place. They attain a large size, often about six inches in diameter of trunk, but if they bear a very heavy crop, they generally die the following year, precisely as my plums did, in 1886-7, at Sorel.

**Apples.**—Mr. W. A. Hale still despairs of growing apples in the valley of the St. Francis. Fameuse, Tetofsky, Peach, and Baldwin, all die, in three years from planting out, and Montreal Beauty, Rose of Stanstead, Queen's Choice, and other crabs follow in two or three years later. He has tried lime, ashes, bones, in hoed-crops, in sod, with mulch, with top dressing, root-pruning, under-draining, he has badded his own seedling stocks, but all without avail! Trees do live and do well at Sherbrooke on made terraces, the soil of which is nearly all from the surface, and this, too, nearer the river than Mr. Hale's garden, so the river-fogs are not the cause of the persistent failure of his fruit-crop.

### FUCHSIAS

Mr. Bain, the Montreal florist, seems to have devoted much attention to the growth of this most popular flower. To him I am indebted for many of the following notes. The name of the plant is derived from *Fuchs*, a German botanist of the 16th century—*fuchs* in German is *fox* in English.

All the varieties of this lovely plant will not stand the same sort of treatment. The fine specimens we see at our exhibitions have not been allowed to run about as they please, but have undergone a training as rigid and severe as a boy receives at school.—I wish all boys profited as much by their training as the fuchsia does!—Some have to be stopped, i. e. have their hearts nipped out, when about six inches high, and the side shoots must be allowed to grow six inches long before another leader is permitted to start; and so, stopping and growing must alternate until the plant is as thick at bottom as is desired. Others are naturally of a compact habit of growth, and only require to have their side shoots stopped to make them bushy enough.

November and December are the best months for setting cuttings. the plants that have stood out of doors until the frost will afford plenty of well matured slips. The cutting should be strong, healthy, and woody, with not less than three

joints under the sand in the cutting pot, and all leaves except the two top ones should be pinched off to give the young plant a chance of making plenty of roots. Each cutting should have a pot—what is called a *thumb-pot*—to itself. When well taken, and the roots begin to show through the holes of the pots, shift them into three-inch pots, and so on, never allowing them to become pot-bound, which would have the effect of forcing them into flower before they have attained their proper development of stem and leaf.

**Soil.** For striking outtings, use coarse, clean river-sand, and afterwards, take a mixture of yellow loam and leaf-mould, or peat, with an equal bulk of well-rotted horse or cow manure, passing it through a coarse sieve, and adding about half the bulk of clean, coarse river-sand—thus,  $\frac{1}{2}$  yellow loam;  $\frac{1}{2}$  leaf-mould or peat;  $\frac{1}{4}$  well-rotted dung;  $\frac{1}{4}$  sand, will be about the proportions. Plenty of heat, and lots of air and moisture.

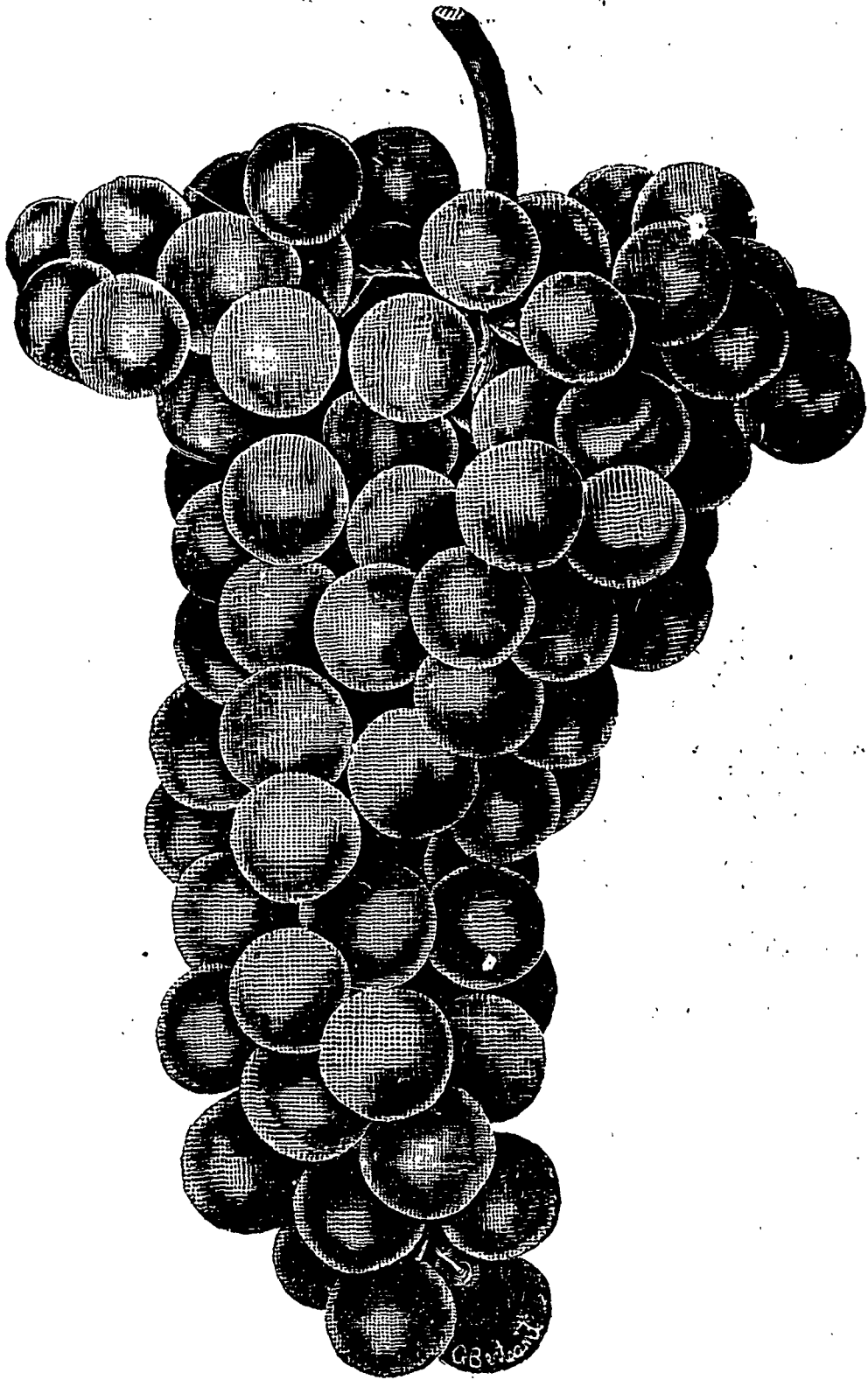
**Insects.**—Red spider—care-moisture and syringing. Tobacco-smoke for green fly and thrips.

**Liquid manure.**—Half a bushel of horse-dung to thirty gallons of water, add the same amount of soot in a bag suspended in the water. The soot, of course, is used for the ammonia it contains, for, as Mr. Sterry Hunt very sensibly observes: "So far as the soot consists of carbon, it possesses no manurial value, since carbon in the free state cannot be appropriated by plants." Soot is said to contain from 3 to 3 $\frac{1}{2}$  per cent. of ammonia, but that must depend upon the height of the chimneys. Bristol, (Eng.) where the chimneys are high, sells its soot at seven pence a bushel, Gloucester, where there are no factories and where, in consequence, the chimneys are low, at five pence.

Old fuchsias should be put in the cellar or root-house to rest until January, when they may be pruned and started into fresh growth.

**Stewart on roots.**—Mr. E. W. Stewart, whose book in feeding animals is a great favourite on this side of the ocean, appreciates roots to a certain degree. He says, in a late number of the *Country Gentleman*, that "the best way to use mangels is to run them through a pulper, and then mix the pulp with the ration of grain or ground food and cut hay. The beet-pulp will not only give a relish to the feed, but it contains *pectic acid*, which is a digester of other food. Four quarts of this pulp, given twice a day, is sufficient to accomplish the great benefits for which roots should be fed—to cleanse the stomach (Mr. S. would find crushed linseed much better for this purpose. A. R. J. F.), prevent constipation (do.), and act as a digester for other food. This mixing in with other food is the true way to feed roots. When fed alone, and in large quantities, roots are a poor food." If the worthy Mr. Stewart had seen the thousands of ripe-fat bullocks from Scotland that I have seen in Smithfield market, not one of which had ever tasted anything all its life but turnips and oatstraw in winter, and grass in summer, he would not call roots a poor food. Mangels, in spite of all the analyses, are poor enough, but swede turnips are anything but poor. Nowadays, nobody, even in Scotland, feeds entirely on turnips and straw, as they used to do forty or even thirty years ago; and instead of giving a bullock turnips enough to fill his belly three times a day, he gets about half a bushel twice a day, with cake, bean-meal, and other succedanea. It was clearly a mistake to make a beast swallow at the least 120 pounds of icy cold water (in his roots), whether he was thirsty or not. Still the roots fattened the beasts ripe-fat, and better meat never came to table than the West-Highlanders, the Galloways, and the Polled Angus of those days, though the first, the Kyloes, were generally only grown in Scotland, and fattened in the Eastern counties of England.





MILLS GRAPE.

As to the poverty of the mangel as a food, I should like any one who doubts it to try the following experiment: take two cows of equal milk producing powers; and feed one on one bushel of mangels, one bushel of grains, and as much oatstraw as she will eat; and the other on one bushel of swedes, and the grains and straw as before; the trial will soon show the difference between the feeding-value of the two species of roots. Not that I mean to cry down mangels: far from it. They will grow on land too heavy for swedes; they yield a heavier crop per acre; they will keep, with care, in good condition up to the end of June, and are then in the best possible state for consumption, having lost a great part of the water they originally contained.

Swedes, as well as mangels, have plenty of pectic acid, but I do not know that that substance has ever been proved to be a digester of other food. It very likely, though, does act in some such fashion.

I am glad to see that Mr. Stewart is sound on the *Escutcheon* question. He remarks, in answer to a question on the subject by a Massachusetts farmer: "As to the advantage of studying the 'marks' on heifer calves indicating large future butter or milk yield, there has been much learning and speculation expended upon the escutcheon, but, practically, it has never repaid the time spent upon it." I sup-

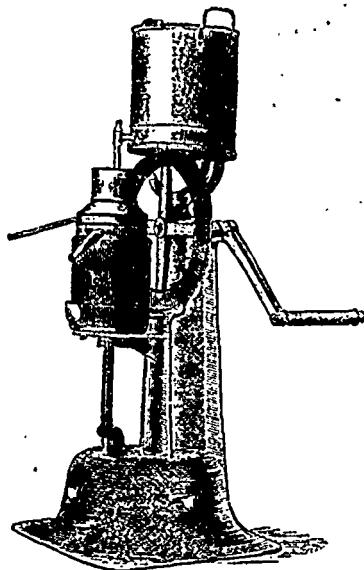


FIG. 1. CREAM SEPARATOR.

pose we may drop this point from our consideration altogether now, as it seems to have for some months fallen into utter dispute. I must take credit to myself for having opposed from the very beginning three things that have turned out failures, but all of which for some time seemed likely to delude the public; 1., the wretched *Boomer's Coprogène*, or system of making manure out of leaves, stubble, and rotten water; 2., the establishment of extensive vineyards in the province of Quebec; and 3., the Guénon, or escutcheon theory of judging the qualities of a milk-cow by the position of certain hairs on her thighs and twist.

#### Contest of Dairy Cattle.

I have never yet felt satisfied that the principles which are laid down for the direction of the judges at our annual exhibitions are correct. There are dairy-cows and dairy-cows. All dairymen do not pursue the same object. Thus, one man sells milk; another makes butter; a third sends his milk to

the cheese factory; a fourth fats calves; a fifth rears all his young stock with a view to the butcher's stall; while a sixth makes butter, rears his young stock, and fattens a certain proportion of both young and old every year. The first, of course, desires that his cow shall yield a large quantity of milk, and up to a certain point is indifferent as to its quality; and so, perhaps, of the third. The other four desire not only a great quantity of milk, but that the quality should be good, too. I really do not see how our dairy-cattle contests should settle the question satisfactorily to all these different wants. The cow that in the height of her season gives only eighteen or twenty pounds of milk a day, rich abundantly in butter-fat though it be, would, unless he watered it, be a positive loss to the first of our friends, and not of much value to Nos. three, four, and five; while to Nos. two and six, she would be a most valuable acquisition. And, for the same reasons, it will not do to say, as some say, that the prize should go to the cow showing the widest difference between the value of her milk product and the cost of the food which produces it; for the milk-seller does not care two straws about the percentage of solids, or whether they consist of ash, casein, or butter-fat: all he wants is a lot of fair saleable milk. The man who fattens calves, or who rears his calves,

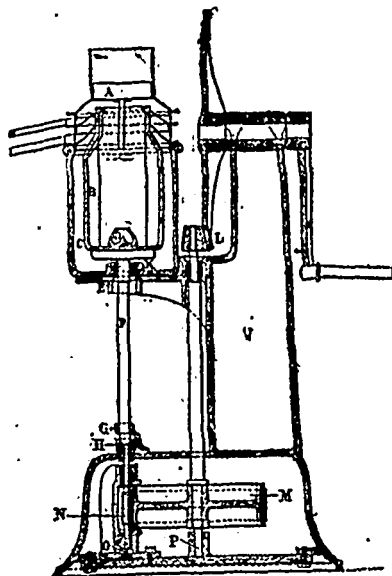


FIG. 2. CREAM SEPARATOR.

the calf sucking the dam in both cases, does better with moderately good milk than with the richest that ever flowed from the udder of a Guernsey or a Jersey.

Well, perhaps I have not fully developed my thoughts on this subject, but the conclusion I want to arrive at is this: there should be three classes of cows in a dairy competition: the milkman's cow, the butter dairyman's cow, and the general purpose cow. It seems to me an absurdity to show a Jersey against a Holstein or a shorthorn, for they are intended to serve two different purposes. As for the fine calculations of the experts in analyses of butter-fat, ash, &c., that will not guide us in the least as to the ultimate profit of a cow's lifetime. For that, we must know what her calves have returned to the breeder; what her milk-products have realised; how much she fetched when at the end of her career she was slaughtered; and how much her food cost from the day of her birth.

We shall never solve the question, because the whole sub-

ject depends upon individual pursuits. The butter-maker will keep Jerseys or some allied breed or cross; the milk dealer will buy grade-Holsteins or Shorthorns; and the Ranchers will rear Herefords, Shorthorns, or Poiled Angus.

A. R. J. F.

#### Public Dairy Contests.

Will it ever be possible to arrange a set of rules governing the tests of dairy cows that will please everybody? It seems hardly possible, after reading the interesting articles on the subject, printed elsewhere. On a few points all agree, while there are sharp differences on others. It seems settled that the best cow is a business cow. The prize should go to the cow showing the widest difference between the value of her milk product and the cost of the food which produced it. There is no dissent from this proposition. All appear to agree that a record of the food consumed by the animal for a week previous to the contest should be kept. The Jersey men would evidently wish to confine the test to butter alone, paying less regard to the skim milk or calves. The Holstein men suggest that, as skim milk and good calves have commercial values, they should in some way be counted in the cow's product. We think the idea is just. The skim milk fed to good calves is certainly worth something, and should be measured and its value counted if the test is to be of practical use to those who propose to save the entire product of the cow. We do not exactly see how what we may call the calf-producing quality of the cow can be measured. We should say that the following plan would be just to all: If the test is to be for 24 hours, let all the cows be fed under the eye of the committee for one week previous to the test. Let the cost of the food given during the seven days of preparation and the one day of test, divided by eight, represent the cost of the milk product. Let every specimen of milk be treated by the same process. Let the butter and skim-milk be valued at given prices per pound. Let each cow's product be reduced in this way to dollars and cents. Subtract from this result the amount charged to the cow for food. Give the prize to the cow with the best business showing. Cannot a test be arranged on this basis? It will take longer and require more care and skill, but it will give more general satisfaction and leave less grounds for complaints.

If a small cow is a more economical machine than a large one, we ought to know it. Or, if one breed gets a larger percentage of value from a given quantity of food than another, that is an important fact, which public tests may serve to bring out. The idea, put forth by the Germans, that the food of support is proportioned to the live weight of the animal, I believe is false. I think it is contradicted by the experience of every feeder. One cow will consume nearly twice as much as another of the same size, without giving any better return of milk, or keeping in better flesh; whether one breed gets more nutriment from its food than another, or whether the waste in the system is less in one breed than another I do not know. It is to answer this question that public tests, often repeated, should be encouraged. It is the only way to get an answer.

A fact that is too often lost sight of is the veal and beef-producing qualities of the animal. These should also be taken into account. It would be folly to say that a cow weighing 800 pounds would be of equal dairy value to one weighing 1,600 pounds, providing the amount of food consumed and the amount of milk or butter produced were equal, and it would be equal folly to say that the male calves of the larger cow would not be more valuable than those of the smaller for veal.

Again, the question of vigor and hardiness would be taken

into account in selecting a breed of cattle for practical dairy value, but this could not be determined by any test at a show or fair, as could the other qualities. Thus, if any association would desire to justly and accurately decide between two breeds, the question of butter, milk, skim-milk and beef, should be taken into consideration.

R. N.-Y.

*Back-carriage.*—Scores of sleighs, loaded with hay for Montreal, pass my house every day, but on their return, not one in ten brings back manure! How long do people imagine land can go on producing hay without any re-payment? There is an abundance of horse-manure to be had in Montreal for nothing, but of course it is not always in the handiest places. No wonder the farms in this neighbourhood are getting poorer and poorer every year!

*Weight of ensilage.*—I recommend to the study of Mr. Sidney Fisher, whose address to the Dairymen's Association at Huntingdon last February was well worth reading, an article by President Chamberlain on the weight of ensilage, published in the Journal for March. Mr. Fisher talks about growing 35 tons of ensilage to the acre, but, I should like to know whether he weighed every load, weighed one or two loads and judged the weight of the whole by the sample; or calculated the weight by the cubic contents of the silo after it was filled. Mr. Chamberlain may well say that he thinks "from our weighings the yield per acre of ensilage corn has been usually over-estimated." His three silos should hold, as they were filled last season, 250 tons of green, or slightly wilted, mature ensilage; but he put into them, by actual weight, of half-dried ensilage just 95 tons! Mr. Chamberlain reckons that a load of his green corn which weighed 30 cwt., by the time it was carried to the silo had lost a trifle more than half its weight. A silo to contain four acres of corn yielding thirty-five tons an acre must have the following dimensions, supposing it to be filled to the brim, 20 x 20 x 18.50, if a ton of ensilage occupies a space of 50 cubic feet. The professor evidently does not believe in the gigantic crops we so often hear of.

*Minnesota farming.*—"We Westerners, of this section at least, never use any commercial fertilisers. As manure for oats I use corn stalks; at least, I do not cut my corn. It costs about \$1.50 an acre to cut it; considerably more to husk it when cut; and \$1.00 an acre for binding the fodder &c. Bear in mind that by leaving it on the ground we get the full manure-value for nothing." And then the writer goes on to talk about the abundance of carbohydrates in the soils of the West, and concludes by saying that, as he bought clover-hay for \$2.00 a ton, he would have lost \$1.00 an acre on every acre of corn he cut. Fancy a field of corn-stalks ploughed in for manure! And this letter is published in a leading agricultural paper of the United States, without the slightest editorial comment! The carbohydrates may be plentiful in Minnesota, but, anyhow, they are of some value for feed, whereas they are useless as manure. I never get saw a really good farmer who was untidy in his work: all the best men I have known have always taken a pride in the neatness of their fields when the operations of sowing were finished, but what a sight must the outfields of the State in question present with the stalks sticking out of the ground, here and there, like dead men's legs, and with the heaps of earth dragged up by the harrows as they jolter along with the bits of stalk and the leaves nicely choking the tines. Oh, no! this is not farming.

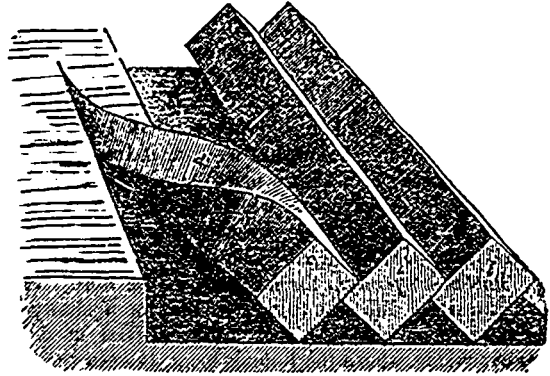
*Iowa-farming.*—This is more like it! On the same page as the last letter appears the following from Iowa, condensed:

"For oats I should plough in the fall. This I would cultivate well, and would sow two bushels an acre, broadcast, and harrow with a good harrow. I would sow as soon as the frost was out of the ground, and the land dry enough to work well." I do not quite see how the seed is to be covered deep enough if the land is to be cultivated—with a grubber I presume,—unless the sowing is followed by the grubber, or done with a machine with grubber-teeth on behind, to let the seed into the ground. Two bushels of oats are about half enough, and it is no wonder we hear of such small crops of grain in the States if the farmers persist in using such small quantities of seed. But to proceed: "It would make a good farmer groan to see some of our Western men go out in the spring and sow their oats in a field of corn-stalks, that has been trodden all the winter by stock; then take a cultivator, and scratch the seed in!" Without ploughing of course; but that is nothing, compared with Mr. F. D. Curtis' plan of sowing oat on unploughed land and letting them lie at the mercy of crows, blackbirds, mice, &c., and take their chance of finding an interstice here and there for their roots to thrust themselves into; these Western men (Minnesota-men?) do cultivate, whereas Mr. Curtis does nothing of the sort. "I would cut," continues the writer, "after the grain begins to harden out of the dough state. If the crop is cut then, the grain is not injured, while the straw is more valuable for food." Very good, Mr. F. S. White, of Polk Co., Iowa: you have the root of the matter in you, and I hope your neighbours in the other Western States will profit by your teaching.

**New oats.**—Professor Storer calls attention to the fact that newly harvested oats are not fit to give horses. They loosen the bowels, and cause the horses to sweat profusely. True, enough, but not new. In England, a reserve of the oats of the previous season is generally kept to serve up to November, by which time the new oats have sweated in the stack, and have become more "full of proof," as our men say. Hunters and racers always have oats a twelvemonth old given them. These cost a shilling a bushel more than new oats, but are well worth it when hard and fast work is required. Oatmeal, too, for mixing with boiled horse-flesh for hounds, is also kept twelve months before using. Some beneficial change must be undergone by the kernel of the grain in these cases, but what that change is no one has, as yet, explained, any more than the reason why new barley never malts kindly before December. There must be something more involved than the evaporation of the water. Old hay, both of clover and meadow grass, is always worth a pound a ton in England more than new hay.

**Sparrows.**—The *passer domesticus*, or English sparrow, has become a great nuisance here. To get rid of him, take a small teaspoonful of strychnine, which dissolved in a teacupful of strong vinegar. To this, mixed with a gallon of water, add as much wheat, barley, or rye, as will soak the whole up. This will soon thin the pestiferous flock, if it is scattered in different places every day. Unfortunately, like poisoned eggs for magpies and jays, the birds will, sooner or later, discover the plot, and shun the treacherous feast. In or about 1847, our gamekeepers at Wenloe Castle, in the rough country in Glamorganshire, South Wales, began to poison vermin with strychnine in eggs. Very shortly afterwards, 120 pies and jays were picked up dead, but in less than two months after the plan was tried, it was common enough to see one of the crafty brutes go up to an egg, look at it, study a little time, and then fly away. In six months from the commencement, the scheme was given up, as the birds were no longer deceivable. How on earth did they know?

**Movement and position of the furrow slices.**—The accompanying engraving, taken from Stephen's Book of the Farm, shows the way in which the furrow slices are turned over, and the position in which they should lie after the operation is concluded. Each slice is supposed to be 10 inches broad by 7 inches deep, and the angle at which these parallelograms are laid is half a right angle=45 degrees. It needs only a glance at the cut to convince any unprejudiced person that it is far easier for the harrows to take hold of the crests of furrows in this position and of this shape, than when a



A VIEW AT THE MOVEMENT OF THE FURROW-SLICE.

slice is taken of fourteen inches wide by seven deep, as recommended by those who use the American *chilled* plough. The latter furrow is flat enough, to start with, and the rains of early winter and spring must beat it still flatter, which, no doubt, is one of the reasons why we sometimes hear of men who "don't hold with fall-ploughing."

**Preparation of land.**—I hope that all those who are intending to put in their seed with one of the numerous kinds of broadcast seeders will prepare their land properly before sowing. These implements do their work well, but they are not intended to do more than sow and bury the seed at a fair depth. The land should be harrowed both before and after the seeder, and no one should leave off until the ground treads equally underfoot all over the piece. Believe me, my dear friends, the expense of an extra stroke or two of the harrows is invariably repaid you at harvest-time. Do not omit the rolling.

**The Old Style.**—To-day is the 2nd March, old style, our present 13th. To this date the proverb refers: "March comes in like a lion," and this year there no mistake about it. On Sunday morning the snow began to fall in thick, flocky flakes, and kept on in that fashion, with a thaw and Easterly wind all day and all night; early on Monday the wind was round at the West, and the snow was still falling in fine powder, and drifting as it fell; there was, fortunately, but little wind. It kept on thus all day and night, until Tuesday morning,—to-day—when, at ten o'clock, the snow ceased, and the raging wind, which had been travelling towards us from the N. West ever since Friday, began with full force. I have been thirty years in Canada, and this is the worst specimen of the weather I have yet seen. Well, I hope "March will go out like a lamb," that is that by the twelfth of April—the first, old style—we shall have spring. I have not seen a crow yet, though there are, I am told, plenty round the Montreal Mountain; but they are, probably, crafty beggars that have passed the winter in the bush close by. I never want to see a crow before the 20th. If they arrive from the South before that date, the early part of

April is generally fine, but winter returns again, and nothing starts to grow till about the fifteenth of May.

The unusually early advent of all migratory birds is a bad sign. I remember well the spring of 1874. I find in my Journal of that year that the first robin (thrush) was seen at Compton on March 30th. Poor bird! How severely he must have felt his error in leaving his Southern *villeggiatura*, when he saw the thermometer the next morning:—12° F.! Swallows made their appearance on April 12th. What followed? On the 30th of that month 18 inches of snow fell, winter returned, and there was no pleasant weather till May 12th!

Now, birds leave the South because unpleasant weather has set in there, unfortunately it follows them northwards, and the poor things are sold. See Journal of Ag. for February, 1881.

*Hackney*.—This word has puzzled me a good deal for some time. I of course knew that we got it from the French *haquenée*, a horse (or rather a mare) used by the knight to save his *destrier*, or warhorse, when travelling, but I did not know till last night that the French derived the term from the Spanish *acunca*, a light galloway generally ridden by ladies. The best synonym for *hackney* is the word *roadster*. A *hack* is quite a different thing: it may be a showy beast for riding in the Park, or a thoroughbred weed, used to ride to the covert-side, where the hounds meet, to save the hunter, which is generally "sent on," over night, if the meet is far from the stables, or early in the morning, if within a moderate distance.

*Harrowing*.—By the bye, I may as well mention that in all fields being on an incline or slope, the harrows should be driven down the slope, and back again over the same space. It is much easier for the horses to work in this way, than to harrow up and down once over the whole field, and then give the second stroke back again. If the gate is at the bottom, or lower part of the field, the harrowing should begin at the foot of the inclination, and the part next the fence should be ascended and the second ridge descended. Then, let the harrows ascend the first ridge again, and descend the third and so on. Thus, the *breaking in* will always be done downhill. I speak of this because last year, on a very hilly bit of land, I saw a pair of horses hard put to it to do their work. Their inconsiderate driver made them break in the whole time uphill, and when I tried to show him that the other plan would be easier for himself as well as for the horses, he replied, in a very impolite way: It don't make no odds! I should very much have liked to put him into harness for half an hour and let him feel how great odds it really does make. Of course, on the plan I recommend, the first ridge will get both its strokes of the harrows in the same direction, which is anomalous, but the anomaly should be submitted to, in order to gain a favourable point for the horses. Horses cannot go to quick at harrow. I had almost added: nor too slow at plough! Of course, that is an exaggeration, but nine teams out of ten I see here walk so fast that the best ploughman in Britain could not make good work with them.

Never omit cross-harrowing, and finish with a single stroke in the direction of the ridges. The Sorel land—as tender a soil as can be—required at least two double times along, two cross-times, and one finisher along, to do it properly. What then must the heavy, raw clays of St. Hyacinthe require? Do they ever get half-cultivated?

To judge of the harrowing of land, the sense of feeling is required as well as the sense of sight. When well done, the friable portion of the soil seems uniformly smooth, and the clods lie free on the surface, waiting for the pulverising effects of the roller; and the ground feels uniformly soft under the

pressure of the foot. When the land is not harrowed enough, the surface looks harsh, the clods are half hidden in the soil, and the ground feels unequal under foot—in some parts resisting its pressure, in others giving way to it too easily. As I remember writing last year: the best way to ascertain if land is sufficiently harrowed, is to draw the toe of the boot along the surface, and if a regular groove can be made a couple of inches deep, and the boot meets with no interruption from clods, the land may be considered perfectly cultivated.

I know I "keep on" about this point, but I do so because, as a rule, it is at the root of the poverty of our crops. The object of harrowing is not merely to cover the seed, but to pulverise the ground, and to render it uniform in texture. Uniformity of texture maintains in the soil an equable temperature; the land does not absorb rain so fast, or admit drought so easily, as when it is rough and kept open by clods.

*The Grubber*.—Those who have no seeder will find it a good plan to harrow the land well, sow the seed by hand, pass the grubber across the piece, give a couple or more strokes of the barrow, and finish with the roller. With the very hot summer we enjoy here, it is of real importance to bury the seed at a fair depth. A drill is the best machine for sowing: there can be no doubt about that, and I cannot understand the popularity of the broadcast seeder except where the stones are too plentiful to allow the drill to work. Both the seeder and the grubber must necessarily bury the seed at unequal depths, just as common hand-broadcasting and the subsequent harrowing do. The drill, on the other hand, deposits all the seed at the same depth—the depth, whether one, two, or three inches can be controlled—and consequently the young plants come up regularly; grow regularly; and ripen all at the same time.

*Green-meat*.—My friend Mr. Bickford West, will do well to get a piece of land ready towards September, and sow it with winter rye. Thick-sown this ought to be; not less than 2½ bushels an acre, and the lightest piece of land on the farm will be the most suitable. No manure necessary, but the cultivation, i. e., the ploughing and harrowing must be most carefully done. This should be fit to mow for the cows by the 20th May following, and, if the land is clean, it can be manured, ploughed, and sown, with my mixture of oats, pease, tares, and corn. Or, if he finds that he has plenty of summer-food, Mr. West might sow Hungarian grass—30 lbs. an acre—for hay—or swedes. The Hungarian grass must be cut green: when the blossom has fallen it—orchard-grass too—is little better than dried sticks. On quick land, swedes do well here if soon by the 20th June. The earlier sown yield the heavier crop, but the quality of the later sown is superior. As Mr. West is a butter-maker, I cannot recommend fodder-corn for cutting green for his cows: "There is nothing in it," as "Sir Charles Goldstream" says.

Mr. West tells me his land is dry and of first-rate productive power. Why not prepare a piece of it, say, two acres, for lucerne? The seed—20 lbs. an acre—may be sown with the spring-grain, and rolled in, just like clover. After the second winter, the more it is harrowed in the fall the better it will do. It should give at least three cuttings a year, and if allowed to lie and wilt four or five hours after mowing, there is no fear of the cows getting blown on it. It can be mown at any time, but is at its best when just coming into bloom; still, as it becomes sticky very soon after the blossom appears, it had better be begun upon in time. Give plenty of plaster every spring, and roll with a heavy roller before the land has become too dry. In 1879, after a drought of more than four weeks, Mr. R. H. Stephens, of St. Lambert's, cut

his lucerne, for the first time, on the last day of May. It was from two feet to two and a-half feet high. The year before, he cut it for the second time on June 21st. He gets four cuttings a year, and finds stock do well on it. Economy of time and labour indicate a piece of land near the stables for the lucerne. It will take all the manure that can be spared, but if sown on clean land it will pay, for it, particularly in a dry season.

Between the first and second cutting of the lucerne, the first cutting of red-clover and orchard-grass should intervene. Two bushels of orchard-grass and eight pounds of red-clover—*trifolium pratense perenne*; if Mr. West will get it from England he will not repent—will be sufficient for an acre. Alsike-clover may be added, but I do not think it advisable unless its lasting qualities have been proved in the neighbourhood of Georgeville, as it does not suit some soils. With these fodder-crops, I do not see but what the full yield of milk can be kept up all through the season. I should be inclined, during the fly-time, to keep my milch-cows in from ten A. M. till five P. M. A couple of pounds of linseed or cotton-seed-cake a day to each cow would help the butter amazingly, always taking care to select the best samples of decorticated cotton-seed-cake.

#### OUR ENGRAVINGS.

*Scotch plough at work.*—See p. 70.

*De Laval's manual cream separator.*—The trials of this separator at Dorchester by the Bath and West of England Society and at Newcastle by the Royal Agricultural Society of England, have already been noticed. By means of the annexed two engravings the mechanical construction of this new separator and the improvements on the old steam-power machines will be pointed out.

Fig. 1 is a front elevation taken from the standpoint of the dairyman at the winch-handle, and fig. 2 a section through the several centres of rotation at right angles to the former view, the new-milk supply-pail on the top of the tripod standard (fig. 1) being left out, the better to show the other working details.

*The new grape "Mills."*—This is now for the first time offered for sale by Ellwanger & Barry, of Rochester, N. Y., a firm whose care in trying all novelties is a guarantee of its merits. We have a vine growing in the Rural Grounds, but are not as yet able to speak of it from experience. It is said that this new grape combines quality with hardiness, vigor and productiveness, and Ellwanger & Barry, whose statements are always conservative, say that for size, quality and appearance, it comes the nearest to their ideal of any variety they have seen. It was raised by Mr. William Mills, of Hamilton, Ont., by crossing the Muscat Hamburgh with Creveling. The bunch, as shown at page 73, is large, compact, shouldered and some of the bunches have weighed 12 ounces. The berry is large, round, jet black, covered with a thick bloom. The flesh is firm, meaty, juicy and breaking. The skin is thick and the berries adhere firmly to the peduncle. The vine is said to be vigorous and productive, the foliage large and healthy. It ripens with the Concord, or a little later, and is a good keeper. Let us hope it will not disappoint the grape-growing public.

Georgeville, P. Q., 20th March, 1888.

TO THE EDITOR ILLUSTRATED JOURNAL OF AGRICULTURE.

There has been some discussion among the farmers in this neighbourhood about starting a cheese factory, or creamery, and the majority are, I think, in favor of the creamery, principally because it leaves so good a supply of milk for calves

and pigs. As the Stanstead creamery (cream gathering) is in operation not many miles from us and has given great satisfaction to some of the patrons, we are inclined to think it would be the most suitable for us, but the "Separator" system has made such headway the last few years that we should like to know your views on the subject, so as to be able to form an estimate as to which is the most satisfactory and profitable in its working. As regards our situation in the matter of patrons, there are farms carrying about 350 cows within two miles of a spot where several roads converge, and no doubt in the event of a successful creamery being in operation this number would be increased considerably. By going 4 or five miles from the proposed site it would not be difficult to get 500 or 600 cows. The roads are good but several of them very hilly. Unless there is some decided advantage in the "Separator" system I imagine 9 out of 10 farmers would prefer the "Cooley Can," although of course to those who are not favorably situated as regards cold springs, or ice, this system would be unsuitable.

I must state that hitherto the subject has only been discussed by a few of us, and we could not say at present with any certainty whether it would be possible to secure a large number of farmers, but as several in the neighbourhood have been talking over the project lately and would like more light on the subject, you would confer a favor by giving us the good points of both systems, and stating also what the probable expense of starting would be in each case for a creamery of about 400 cows.

Please also say what you think of cheese factories as compared with creameries—quite a number here say that raising young stock nowadays (except to keep up the supply of milking cows) is a dead loss and on that account prefer the cheese factory where the whole product is manufactured.

Yours respectfully,

BICKFORD WEST.

Three-Rivers, 26th March, 1888.

BICKFORD WEST, ESQUIRE, GEORGEVILLE, Q.

*Dear Sir,*—There seems to be no doubt that the Separator will give an average of 15% more butter than will the best system of cream raising. The difference may be even doubled, or worse, when the milk cannot be sufficiently cooled. Of course, the "separated" milk remains that much poorer for calves, home use, &c. On the other hand, "cream gathering" is possible from distant farms and in hilly roads, &c., where milk could not be safely carried to the Separator.

"350 cows, within two miles of a spot where several roads converge" would make a splendid beginning for a factory. Where milk is cooled down to 70° on the farm, it can then be safely carried five miles. You are therefore in the very best of circumstances for a first class factory—be it butter or cheese. Of course, cream alone when cold can be carried a very long distance without churning, even 20 miles or more.

No farm in Canada is so situated that milk cannot be thoroughly cooled. Where no cold spring can be found, a good supply of well-water will prepare milk for a five-mile carriage. But an ice house can be built for a few dollars, and ice or snow collected in abundance and without much effort, by any intelligent farmer, so as to cool to perfection, not only his milk, but all he needs in the summer for his family.

You say that some farmers would rather raise less stock and turn their milk into cheese. Now, they can turn it into butter as well and profitably so, even if they raise neither calves nor pigs. The cows themselves would soon remember how good sweet milk is to them; and the farmer learn what excellent food for cows, skim-milk is. Thus, nothing but fat would leave the farm; and science teaches, that fat, or carbon, coming



entirely from the air, takes nothing away from the farm, whilst cheese does carry away a good deal.

The questions you raise respecting the comparative advantages of cream raising as against the *Separator*,—and of butter as compared with cheese,—will require considerable elucidation. Let me say, however, that, to day, the best authorities admit that under such advantages as those you possess, a *model factory* should turn your milk either into butter or into cheese according to the demands of the market, and that no extra cost would be then required to take in even the gathered cream. All that would be needed in such a case, would be a separate account for such patrons as supply cream only and, of course, a separate churning. Thus you could raise calves in the spring with a part, or the whole of your skim milk, sending, if you liked, cream only, or also more or less full-milk to the factory, just as it would suit the farmer best.

The combined factory does not even need any thing like either double capital or space. Of course it takes more than either, alone, would require; and especially, it takes a better man and a more thorough maker as manager. But then, the profits are greatly increased, as well as the conveniences.

The cost of a factory, either single or combined, depends so very much on local circumstances, that it is impossible for one who is ignorant of them to make a fair estimate. However, it strikes me that a perfectly model combined factory need not cost you over four thousand dollars. And should you secure 600 cows to supply the milk, the profits—at the ordinary charges for making, should be very large, over 30% p. annum. With enlightened farmers, the best system of organisation consists in a joint stock Co., at so much per cow. At \$700 per cow, and 600 cows, your capital would be \$4200. This secured in one way or another, all you want is a very competent honest maker of butter and cheese who would guarantee his produce to be of the very best, and charge you so much a lb. for making. Unfortunately, it is generally very difficult to make farmers agree to what is for their best interests. In such case, the next best becomes the aim. And again, such a maker as I describe is not easily found.

As the season is already far advanced, should you decide to open a factory this summer, you would require to build and fill up a good sized ice house, say 24 feet square and 12 to 16 feet high, at once, as soon as the farmers are agreed to supply the factory with the milk of over 300 cows. Then try and find a thoroughly competent maker, who would advise you as to what is best for your locality. However, at this late hour, it becomes difficult to lay down perfectly matured plans, and to execute them under the best circumstances of economy.

Here is a point, which will help you greatly, I think, in securing a fair hearing from the farmers, and, I believe, induce them to produce an abundance of good milk. An ordinary fair milch-cow will give an average of say 20 lbs. of milk all through the season, on less food than is needed to produce an increase of a pound and a half of fat meat, live weight. This milk should produce *nearly* one lb. of butter, or fully 2 lbs. of cheese. You can obtain an average of 4c live weight for your beef, or 6c; and 10c a lb. for cheese, or 20c, with, say the same amount of food the year through. Therefore the farmer who, under such circumstances, turns all the food he can into milk—be it butter or cheese is rather immaterial—and not into beef; is the farmer who succeeds. If I am wrong in this, I would feel much obliged for the proof of such error.

This letter is already very long—too long perhaps, and yet I have only hinted,—so to say,—at the points raised in your letter. I shall try and take them up singly in the *Journal*, as soon as possible. In the mean time, I shall feel grateful

for a continuance of your very practical correspondence, on these subjects, of truly national interest, to the country.

I remain, in the mean time yours very respectfully,  
ED. A. BARNARD.

#### Central Experimental Farm, Ottawa.

Bulletin No. 3.—March 15th, 1888.

We are indebted to Professor Saunders of the Experimental farm at Ottawa for a copy of an essay of Smuts affecting Wheat, by James Fletcher, F. R. S. G., F. L. S., the entomologist and botanist to the Dominion Experimental Farms.

These divers fungi have been long known as dire enemies of the wheat crop in England, and we had, many years before I left that country, succeeded in putting a complete stop to their ravages by the use of very simple means. There are several steeps in use there: sulphate of copper (for which see below), and arsenic, are very effective, but both are poisonous, and chickens, pigeons, and partridges, often die from eating wheat soaked with these matters. Sulphate of soda (Glauber's salts) and lime, are good, and so are lime and salt. Both these mixtures are perfectly innoxious and should be used thus: 1. One pound of sulphate of soda, dissolved in two quarts of water, should be sprinkled over four bushels of wheat, which should be dried with recently slaked lime, 2. Make four bushels of wheat into a conical heap, on which place a large pail of scalding hot water; put a few lumps of quicklime into the water, which will produce a violent ebullition; the lime-water will flow over the heap of wheat—what remains in the pail should be carefully poured over the wheat, the undissolved stuff remaining in the vessel—the grain having been dusted over with salt, and turned two or three times, will soon dry, and can be sown *by hand* at once. If to be drilled, it would be better to keep it two or three days, lest it such choke the wheels of the implement. This latter plan I followed for ten years, and though of course smutty ears were to be seen, as they always are, here and there, over a field of wheat, the crop was invariably sound and clean. I do not like poisons in the field, though, in the case of potatoes, we must sometimes use them. As a rule, wheat seed a twelve-month after threshing is free from danger of smut. In Scotland, fall-wheat is not often sown, but when it is, the seed of the preceding year is necessarily taken, as the crop of the season is not threshable in time, and smut rarely affects the following crop, even though no dressing be applied, which dressing is usually *chamber-lye*, the grain being subsequently sprinkled with newly slaked lime.

In Canada, I have not seen much smut in spring-sown wheat, but no doubt the fall-wheat often suffers from it. The following extracts are from the Bulletin: A. R. J. F.

All grain for seed should, of course, be procured as free as possible from smut, but when there is the slightest doubt about its presence, the trouble and expense of treating the seed are so small that there is no excuse for not doing so.

The remedies which have been most successful are those in which methods have been adopted, to destroy the spores adhering to the seed-wheat previous to sowing. To accomplish this it is necessary to wash the grain thoroughly or to steep it in some weak poisonous solution, so as either to remove or to destroy the fungous germs without injuring the germinating qualities of the seed, and, moreover, it seems highly probable that a sufficiency of the material used for this purpose will adhere to the seed and protect it against the attack of any spores which may be present in the soil at the time the wheat is sown.

Of a great many remedies which have been tried with more or less success, I select the three following as being in my opinion, the best both for efficiency and convenience. The

first and second I have myself frequently tried with manifest success. The third is given on the authority of Mr. Worthington G. Smith.

### 1. SULPHATE OF COPPER, also called "BLUESTONE" or "BLUE VITRIOL."

This substance can usually be procured in any part of Canada from Druggists or General-store Keepers, at about 10 cents per lb. so that the cost of treating seed with the strongest solution recommended below, would not exceed 2½ cents per bushel. The different methods of applying this substance to the grain vary slightly; but the differences are merely with regard to the extent to which it is deemed advisable to wet the seed. Some advise soaking the grain; but it would appear from the results of many experiments that this is not necessary. Mr. Worthington G. Smith advises the following: "1 lb. of bluestone dissolved in 5 quarts of boiling water is sufficient for a sack of four imperial bushels. The wheat is soaked for 10 minutes, or the 10 pints of solution may be poured over till all is absorbed."

### 2. BRINE AND LIME.

A remedy generally available at country farm houses and from which good results have been secured, is to soak the grain for 10 or 15 minutes in brine of the ordinary strength used for pickling pork (i. e. in which a fresh egg will float). If well stirred many of the smut spores, smutty and imperfect grains, &c., will rise to the surface, and can be skimmed off and destroyed. After the brine is poured off, the wheat must be dried by dusting lime over it until all the grains are white.

It is claimed that sprinkling the brine on the grain instead of soaking it as above, before dusting it with lime has been found successful; but I have never tried this method.

### 3. ALKALINE WATER.

It might happen that none of the above-mentioned materials were obtainable and in such case the mere washing of the seed would be beneficial. Mr. Smith says "as the spores are lighter than water steeping in brine or even pure water is often effectual, as the spores float, and are easily washed away. Some alkaline ley should be added if water is used, as the oil on the surface of the spores combines with the alkali and forms a soapy substance which is fatal to effectual spore germination."

An alkaline ley suitable for the above purpose may be made by adding to three or four gallons of boiling water, in any suitable vessel, one gallon of hard-wood ashes and stirring frequently until the alkaline properties of the ashes are extracted; or an alkaline solution of sufficient strength may be made by dissolving about 2 lbs. of ordinary washing soda in a pailful of water. (1).

*Review.*—"Petit Traité sur le Dessèchement et le Drainage des terres," by Ed. A. Barnard, Director of Agriculture, P. Q.; with 35 engravings, pp. 36, Senécal & Fils, rue Saint-Vincent, Montreal, 1887.

This short elementary work on drainage has been forwarded to us rather late in the day, as it has been in circulation for some 10 months.

Mr. Barnard's great experience, extending over more than thirty years of practical farm-life, twenty of which have been devoted to the public service, should be a sufficient testimony to his fitness for the composition of a treatise on drainage, and accordingly we welcome the appearance of this little work, feeling sure that the principles therein laid down must be in accordance with the opinions of those who are known as authorities on the subject.

(1) Chamber-ey can always be had, and is all the better for being kept till the fumes irritate the nose.

A. R. J. F.

The pamphlet being written in the author's native language—a tongue, alas, studied by but a small number of our Anglo-Canadians,—obliges me to translate the passages I propose to quote from the work.

I may as well say at once, that with the exception of one or two very trifling passages, Mr. Barnard's views agree perfectly with those that I have always held from the time I first inspected the Government loan expenditure at Chislehurst, the Regent's Park, and Chesterford—all in England—as may be seen more thoroughly set forth in the series of articles on drainage in the Journal for the months of November, December and January, 1880, '81.

9. "Land is said to be *permeable*, when no water stands in the furrows between the ridges 24 hours after the heaviest rains." A good deal of our lighter soils are in this condition, and for the convenience of the mower, &c., should be ploughed in very wide divisions, or laid in one piece by means of the turn wres, the Brabant, or other plough made for that purpose.

10. "All soils that do not fulfil the above conditions must be drained. They are qualified as *impermeable*." Impermeable is merely a term used to denote great tenacity of texture, owing to which the rain has great difficulty in making its way through such soil. No land, not even our heaviest English Oxford-clay, is really impermeable, if it were, how could the rain-water get into the drain-pipes four feet and upwards below the surface.

11. "Three things are indispensable to the germination of seeds, warmth, air, humidity. To allow the entrance of the two first, the superfluous water must be removed, the necessary amount of moisture will remain." We hear some times people talking about land being *over-drained*—even the late Philip Pusey fell into this error.—There is no such thing, believe me. If meadows look *thinner* after drainage it is because of the removal of the sub-aquatic plants.

15. "Land surcharged with water will remain cold. The sun, while warming the surface, will evaporate part of the water contained in the soil, which evaporation will cause the land to become much colder." Mr. Barnard should have said, "the sun, while *trying* to warm, &c." The warmth only succeeds to the evaporation and does not accompany it.

23, 24, 25. *E seq.*—These numbers refer to the management of the ditch-sides, &c.

In drawing out water-furrows, the team should follow the farmer, who walking across the ridges can easily take the most suitable line for the plough to out. Draw the water-furrows last of all, after having passed the double mould board plough between the ridges, and when done, let a man follow behind and with a narrow shovel throw out the crumbs, and clear the intersections of the furrows and the water-furrows.

35. On the width of ridges. I am glad to see that, though the author recommends a general width of 10 to 15 feet for ridges, he admits the necessity of a width of 5 or 6 feet for some very heavy soils. In such soils, the harrows should be made to cover the whole ridge, so that the horses never set foot on the ridge, but walk in the furrows, and thus avoid tramping the land. The "Roothings" in Essex, England, are all in 3 feet six inches ridges; produce nothing but beans, and wheat alternately, with a fallow every third year, and clover every eighth year; crops enormous, except in very wet seasons.

40. "Drainage is costly." Yes, and here it is very costly, as the ordinary labourer does not in the least know how to set about it. An acre of heavy land would cost:

80 rods of four feet drains at, say, 30 cent... \$24.00  
Pipe-tiles for do. 1400 at \$8 p. thousand..... 12.00

\$36.00

I do not think less should be allowed for cartage, freight, &c., than \$2.00 more, and I doubt very much whether any

man would cut, lay pipes, and fill up, for the sum I have mentioned.

54. "As soon as the superfluous water disappears, air follows, and occupies the vacant interstices of the soil."

63. "It is admitted that a conduit of 2 inches bore would run off the heaviest rain in 48 hours from an acre of land." Parkes always holds as proved that a pipe of one-inch bore would do it, and he was right, we may be sure; but I never liked to use pipes of less than  $1\frac{1}{4}$  inch: the inch-pipe was too easily broken. The great lumbering pipes sold here weigh about  $\frac{2}{3}$  too much.

63. "It is acknowledged everywhere that deep-drains—4 feet and upwards—are more efficacious and cheaper than shallower ones." I wish it was! I am afraid that, even in England, farmers have a hankering after a shallow (3 feet) drain. It is a great error, as I showed in volume 2 of this Journal, p. 113, to put down drains at a less depth than Mr. Barnard recommends here.

67. "Main-drains should be six inches lower than the side-drains." Here, I must disagree with the author. Such a fall would drive up the mud from the bottom of the main and infallibly choke it. Three inches are plenty, and this should be rather a slope than a sudden fall.

68. This paragraph is devoted to the mode of entry for the side drains into the main, and is in perfect accordance with my views.

74. Treats of what is known as Elkington's system of drainage, which was never used except for springs, and is long ago abolished.

77. Here is the point: "In order that drains may exert their fullest power, they must run straight up and down the greatest slope." Until this, and the rule that all water gets into the conduit from below, be thoroughly understood and embraced, it will be useless for anybody to attempt to lay out a system of drainage.

96. "The main should be finished throughout its whole length before the pipes are laid." Well, I have no objection to make, if the soil is not subject to cave in, but, for myself, I always have laid the main-pipes, and made the entrances of the laterals perfect as fast as I got over the distances between them, but then I generally had from 25 to 30 drainers at work at once, and could not let three-fourths of them stand idle.

106. Another great point: "When pipe-tiles are used, they must be placed firmly at the bottom of the drain without the drainer entering it." An engraving of the "pipe-layer," is given—fig. 28—the short piece I prefer to have a little sloped, that the pipe may slip off it more easily. To use it, the man stands across the drain with his face to its mouth, and walking backwards, threads a pipe on the short stem of the layer, gives the pipe a tap or two to fix it—perhaps, drops a pebble alongside the pipe, if the drain-bottom is a little wider than it ought to be—and the job is done, except filling in. Stephens, in his Book of the Farm, being used to the wide-bottomed drains orders the drainer to lay pipes with a trowel! No man should be allowed to set foot in a drain after the third draw of the spade is shovelled out. Working backwards the drainer with the semicylindrical tool (fig. 21), takes out the last 15 inches, for a space of say 6 feet; then, taking the draw-scoop (fig. 23), he perfects the bottom; the layer follows with the tool (fig. 28) as before described. It is lovely work, and I never was happier than when I was superintending a good gang of hands. By the bye, the semi-cylindrical spade (fig. 21.) should have a tread to it like that attached to the tramp-pick (fig. 22), a most useful tool, far superior for our purpose than the usual pick, or mattock, or pick axe, which ever local usage pleases.

I am glad to see that Mr. Barnard does not seem comfortable

about the use of the plough for opening drains. It is a *crux* to all beginners, but the author saw instinctively that what was saved by the plough was often lost by the plough—i. e. the tramping of the horses undid all the work and caused caving in, irregular depth, and all sorts of bores.

ARTHUR R. JENNER FUST.

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The Richmond County Agricultural Society will give a Bonus of one hundred dollars for a Stallion to stand in the county for service for the season of 1888. The Stallion to be a Coaching Horse or a Cleveland Bay, to be approved of by the Board of Directors and be shown at the Town of Richmond, Que., on the 17th of May, next, for such approval.

Further particulars on application to the undersigned.

JOHN MAIN, Sec.-Treas.

Melbourne, P. Que., 6th March 1888.

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