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# THE ILLUSTRATED JOURNAL OF AGRICULTURE

PUBLISHED BY THE DEPARTMENT OF AGRICULTURE FOR THE PROVINCE OF QUEBEC.

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## LEGISLATIVE ASSEMBLY.

### Fourth Report of the permanent Committee of Agriculture, Immigration, and Colonisation.

Quebec, May 10th, 1882.

Your Committee has the honour to report: that its attention having been drawn to the fact that certain regrettable difficulties and misunderstandings have existed as to the relations of the Council of Agriculture, and also between the Director of Agriculture and certain of the officers of the said Council of Agriculture; difficulties and misunderstandings which fetter the proper action of the said Council; your Committee has thought it its duty to call before it the Secretary of the Council, M. Georges Leclère, and Mr E. A. Barnard, Director of Agriculture, and Editor of the Journals of Agriculture; in order to make itself acquainted with the nature of these troubles, and to discover a remedy for them.

After hearing the explanations of these gentlemen, as well as those volunteered by the Honourable Commissioner of Agriculture and his deputy, M. Lesage:

Taking into consideration that, in a country of such extent as ours, presenting such striking contrasts as those which exist between the climate of Gaspé and that of the Eastern Townships, the system of culture must be so varied that one and the same rule cannot be laid down for all parts of the province;

That, in order to assist the Council of Agriculture in its endeavour to render justice to all parties, and to make the measures adopted by it for the encouragement of agriculture more efficacious, the Council should be so arranged as to represent all the agricultural districts of the province; and, moreover, that the sub-division of the province into judicial districts might serve as a base on which to settle the representation of our different agricultural interest;

For the above reasons, your Committee respectfully expresses its opinion, that it is desirable:

1st. That the Council of Agriculture be re-organized in such a fashion that it comprise a resident representative for each of the judicial districts of the province to be named by the government, in addition to, at least, ten members, chosen from among the most distinguished agriculturists of the province;

2nd. That the seat of the Council be fixed at Quebec, and that the office of the said Council be also transferred to Quebec.

3rd. That the Commissioner and Deputy-Commissioner of agriculture be members of the said Council, *ex-officio*.

4th. That no regulation of the said Council of Agriculture be put into execution before it shall have been approved by the Lieutenant-Governor in Council.

Your Committee is also of opinion that the system of *régionales* exhibitions, as tending to bring together the farmers of different counties, will be productive of excellent results; and your Committee recommends their adoption in all cases where distance will not render them impracticable.

The best method of promoting the dairy-industry of the province has also been carefully enquired into by your Committee. At its request, M. S. M. Barré, manager of the dairy school of Ste-Marie de Beauce, has presented some most interesting details on the subject, and at the same time, he has submitted a memorial containing a *résumé* of those suggestions which he thinks most likely to tend to the improvement of this most important industry.

Your Committee, without pronouncing upon the merit of all the suggestions contained therein, believes, nevertheless, that its duty enjoins it to submit the memorial, in association with the present report, to your honourable chamber.

DR L. DUHAMEL,

President *pro temp.*

Ste-Marie, Beauce, 1st May 1882.

To the Honourable Committee of Agriculture of the  
Legislative Assembly of Quebec.

GENTLEMEN,

In order to forward the progress, and improve the management of the dairy-industry of this province, I have the honour to submit to you the following suggestions:

1st; Means should be taken to ameliorate the buildings used as creameries and cheese-factories, by making them less subject to be affected by atmospheric changes.

2nd; Information of all kinds likely to conduce to the establishment of creameries and cheese-factories should be spread abroad by means of lectures and publications.

3rd; A travelling professor should be secured, whose duty would be to teach the manufacture of cheese, after the Cheddar system, in our existing factories; and, at the same time, to inspect and report upon them.

4th; The Department of Agriculture and Public Works should cause to be printed schedules, or forms of accounts,

and distribute, gratuitously, a copy to each of the cheese and butter-factories.

5th; The committee might, at the same time, recommend the legislature to adopt a law obliging the proprietors of these industries to make an annual report to the Department of Agriculture and Public Works founded on the above named schedules, under a penalty sufficient in amount to insure the execution of the law.

6th; The association of cheese and butter manufacturers of the province should receive an allowance, for the purpose of enabling them to send delegates to exhibitions and meetings abroad, and to assist them in publishing their reports, &c.

7th; The dairy school of Ste-Marie de Beauce should receive assistance from the government, in order that an experimental station may be established there, for the purpose of making researches as to the best methods of utilising the produce of our milch-cows; to aid in procuring apparatus, utensils, and implements of divers construction; to show the people the real value and efficacy of them, before introducing and recommending them for general use in the new factories.

8th; A special and general exhibition of the dairy products of the province should be encouraged, and, at the same time, a general meeting of the butter and cheese makers of the country should be called.

9th; A museum of all the apparatus, utensils, and implements used in dairy-work, should be formed.

Your most obedient humble servant,  
(Signed) S. M. BARRÉ.

From the French.

#### First steps in Farming—Young Man's Department.

Dear Sir, Knowing you to be an authority I would respectfully ask for your opinion as to the value of limestone ground as fine as flour without having been burnt, as a manure for land. I ask this as I have read that some of the most valuable parts pass off in the process of burning.

Yours respectfully, F. C. CREAN.

Strangely enough, the article I intended for this month's number will be a full reply to my friend Mr Crean's question. We will, then, proceed to consider the use of lime in agriculture.

And first, what is the shape in which lime is usually found? There are three principal forms of lime: carbonate of lime—chalk and limestone; sulphate of lime, or *gypsum*, called also *selenite*; and the phosphate of lime, of which we have spoken already. The sulphate, here called land-plaster, we will talk about later; at present, our business lies with the rock or limestone; for chalk, which, in England, forms the subsoil of large tracts of country, and is there used on the land either raw or burnt into lime, does not exist in the Dominion.

Limestone is a carbonate of lime; that is, it is a compound of carbonic acid gas and caustic lime. The carbonic acid is combined with the lime by so weak an attraction, that heat alone is sufficient to expel the acid and the trifling quantity of water which the limestone contains. If you will put a small piece of limestone into a cup, and pour *muric acid* upon it, the stone will be decomposed, and the carbonic acid will bubble up through the fluid, until the muriatic acid is fully combined with lime, and its powers entirely neutralised. Very strong vinegar will have the same effect. It is this deadly carbonic acid which causes the death of those persons, who, attracted by the warmth, incautiously sleep too near the kilns when in work.

I need hardly dilate on the manner of burning lime, and Mr Crean's question is already partly answered; for if, as is the case, burning limestone only dissipates the carbonic acid

gas, we need not trouble ourselves about it. But whether it is better to burn or to grind limestone is another thing, and demands an argument.

If, as I suppose it sometimes is, the object be to reduce the stone into a state of the most intensely fine powder, to act as a mechanical agent in lightening heavy clay soils; if the expense of grinding be less than the expense of burning; and if the lapse of two or three years be no object; then, I think it would be permissible to grind. In Kent and other chalk districts, in England, large quantities of chalk are carted on to the land in the autumn; and when attacked by the frost, the pieces tumble into powder and become mixed up with the soil. But the effect is slow, and the haulage expensive. I have tried it, where the chalk cost me nothing, and I preferred paying sixpence a bushel for burnt-chalk, i. e. lime. I doubt whether any grinding, however fine, can equal nature's work in her laboratory. Take a freshly slaked handful of lime and see how light it is; how free from grit and harshness. It won't do. The principle is the same as that involved in the question so much debated last year: shall we grind our phosphates or dissolve them in acid? I give my voice for chemical decomposition.

But lime has more to do in the soil than simply to lighten it and make it more easily workable. If slaked lime is allowed to remain exposed to the air, the omnipresent carbonic acid of the atmosphere enters into combination with it and brings it back to its original state of carbonate of lime: it has lost its caustic character, but still exists in a state of the finest possible powder.

Now, lime, in its caustic state, is a cooking agent; that is, it acts upon the organic matter in the soil, and helps to convert it into food fit for our crops. It also acts upon the inorganic matters, and, probably, liberates potash and soda from their dormant state, and renders them available for plant-food. But its most important action, this part of the soil is, according to Way, the assistance which it renders in the formation of the double silicates of alumina; and the way in which lime works in this way is very interesting: you will recollect, if you please, that clay is chiefly composed of *silicate* of alumina (v. journal for December 1881, p. 117, and professor Way's discovery of the double silicates should be still fresh in your mind. It seems that this silicate of alumina is a *gourmand*, or rather, a *gourmet*: it prefers one food to another; where it can find lime, it won't put up with soda, and it carries out its principles to the farthest extent. Thus, if a double silicate of alumina and soda exist in the soil, and lime should be brought in contact with it, the silicate of alumina gives up the soda and takes the lime instead, thus giving us silicate of alumina and lime. If potash be added, the lime is discarded and the potash taken up, because the silicate of alumina prefers potash, and we have by the transaction silicate of alumina and potash; but when the fairy ammonia makes her appearance all former loves (broken metaphor) are driven away, even the once loved potash, and we get silicate of alumina and ammonia as the fruits of the alliance.

Here we see caustic lime acting as a most valuable assistant to our own efforts. It is probably by its means and by the energy with which it works that the first change is wrought, and the double silicate of alumina and lime produced, after which, all the other steps are easy enough, and the grand object the fixing and retention of ammonia is gained.

Nitrate of potash, saltpetre, is also aided in its formation by a dressing of caustic lime, and I observe that, in the last volume of the *Highland Society's Journal*, Dr Aitken, the society's chemist, recommends, as a means of preserving the valuable constituents of a manure heap, the addition of 1/10

part of slaked lime stage by stage as the fresh dung comes out of the stables or sheds. If decomposition has begun, lime will drive off the ammonia and ruin the manure, but when fresh, there is no ammonia to expel, and the nitrogen passes into the state of nitrate of lime. As plant-food, lime is necessary for all crops, as we saw at starting (v. Journal for January 1882, p. 141).

Who remembers the once famous *Rebecca riots* in South Wales? I do, well, and with reason. Strange to say lime was the cause of them. Yes, the primary cause. The tenants under the agreements with their landlords were compelled to *manure or lime* every fifth year. Now, lime could be bought and manure was not to be bought, consequently the farmers went off 15 or 20 miles for lime; for, in the county of Glamorgan especially, a narrow strip of limestone running across the *lias* formation furnishes the only lime to be had, and thus, the distances some of the people had to travel were very great, the turnpikes cost a good deal; and worst of all, the lime from its too frequent application rendered the land so loose and brashy, that the crops, having no root-hold, fell to the ground long before the arrival of harvest, and the hopes of the cultivator were frustrated.

The Welsh are Celts: they are, therefore, impatient, and attributing all their losses to the turnpikes, they first refused payment of tolls, and then smashed the gates and resisted the troops sent to check the disturbances. After a good deal of damage had been done and some lives lost, the law triumphed, and, as a natural sequel, three fourths of the gates were removed; but, unfortunately, many years of sheep-treading in feeding off turnips had to be resorted to before the land became sufficiently compact to hold a crop up as it ought to stand. This was the effect of over-liming; not a thing likely to occur here, as I have yet to see a fair dressing of lime given in this province, but if in the future it should come into use, particularly on our heavy soils, I recommend its being put on in the form of caustic—that is, freshly slaked lime.

The quantity to be used on an acre varies with the texture of the land. On really heavy clays, less than 200 bushels to the acre will not do much good. On lighter soils, 40 bushels, made up into a compost with four times the quantity of earth, and applied as a top-dressing to young grass, I have known to work a great change, bringing up white-clover in abundance where none was previously to be seen. And this is about the only form of compost I can recognize as practically worth the trouble and expense of making.

The older agricultural chemists seem to have dreaded placing lime near recently manured land. The fact is, that the farm is not a laboratory, and though lime would expel ammonia from guano, dried blood, &c., in a chemist's vessel, when mixed with earth by ploughing and harrowing there is not much danger of the antagonists fighting. Lime may be applied at any time, whenever it is convenient, but it should always be put on ploughed ground, well harrowed in, and as thoroughly mixed as possible; the next ploughing will in that case have a tendency to keep it near the surface.

The effects of lime may be stated as follows:

- (1) It encourages the decomposition of the organic matter in the soil.
- (2) It neutralizes the organic acids which make land sour, and it most decidedly improves the quality of the herbage.
- (3) It assists in the liberation of alkaline matters (potash and soda) from the dormant constituents of the soil.
- (4) It promotes the formation of the double silicates.
- (5) It favours the production of nitrate of potash.
- (6) It affords plant food to the crops.
- (7) It lightens heavy land, and, strange to say, it consoli-

dates land that was too shattery before its application; another of the seeming paradoxes of agriculture; just as draining has cured many a burning soil!

(8) The sample of grain and the strength of the straw is always improved by its use.

I said above that lime was a cooking agent: it works up the organic matter; and hence you must take care that it always has something to cook; for if you apply lime on barren sands you will only waste your time, labour, and money, and the last state of the land will be worse than the first.

Recollect that lime always sinks in the soil: hence, four years after liming sink your plough an inch deeper than the old furrow, and bring it up again. In Scotland, where they use enormous quantities, as much as 500 bushels to the acre sometimes, I have seen a regular layer of lime 4 inches below the furrow; to such a depth had the lime of many a lease sunk.

With land-plaster as cheap as it is here, I do not think that, except on very refractory clays, I should be tempted to lime largely, unless I had limestone and fuel in abundance on my farm. The cost of burning lime in such a case ought not to exceed 8 cents a bushel. Near London, an expensive district, the price at the kilns is 12½ cents.

Potash is, at present, rather in disrepute as a manure. It is present in most heavy soils in sufficient quantity, and farmyard dung contains such a lot of it, the ash containing nearly 13 per cent., that where dung is well and plentifully made it can hardly be necessary to buy it. But where potatoes are largely grown without much dung, I should be inclined to try it. The worst of it is that it is almost certain to burn up plants in a dry summer on light land. The chloride of potash is the cheapest form of this manure to be had here, as I believe the German mineral kainit has not yet been imported into this country; it contains, in general, about 25 0/10 of sulphate of potash. At all events, where land has been recently cleared and burnt, this substance is sure to be in plenty. If used, it should be spread and well harrowed in as soon as the land will bear touching in the spring.

I think we may depend upon the following artificials and neglect potash for the present:

FOR ONE ACRE.

Nitrogen	44 lbs = 200 lbs of sulphate of ammonia	
	+ the ni. in the bones.....	= \$8.00
Phosph. acid	80 lbs = 350 lbs of bone-meal.....	= 5.70
Sulph. lime	= 300 lbs of land-plaster.....	= 1.00

14.70

Cattle feeding.

In the year 1853, four of the largest stall-feeders of cattle in the Eastern countries of England, Jonas Webb, the great Southdown ram breeder; his brother, Thomas Webb, of Wilbraham; John Clayden, of Saffron Walden; and Sam. Jonas, of Ickleton, visited my cattle-sheds two or three times to see how I was getting on. At their last visit they told my man, that if it was true, as he said, that all my bullocks had was 5 pounds of bean-or lentil-meal, 2 pounds of linseed-meal, 45 pounds of swedes, and straw chaff, a day, they could not understand how it was that my beasts fattened faster than theirs, which had 15 pounds of linseed cake a day, and as many swedes and as much hay as they chose to eat! When I next saw Mr Jonas, he told me that, no doubt, mine was the right plan, but that on a large occupation like his (he fattened from 200 to 220 large beasts a year, I about 40), it was impossible to look after the men and prevent waste. So you see that feeding cattle is not so simple a matter as it seems to be, for these were all good farmers; men of large means, and brought up to the busi-

ness on which their living depended. Let us see what was the difference of cost between the two systems:

(1) 15 lbs of cake at 2 cents	= \$0.30	
2 bushels, say, of swedes at 12 cents	= 0.24	
12 lbs of hay at £4 a ton	= 0.06	
	0.60	
(2) 5 lbs lentil-meal at 40 s. per quarter	= \$0.09½	} including grinding and crushing in my own mill.
2 lbs linseed-meal at 56 s. per do	= 0.06	
1 bushel turnips at 12 cents	= 0.12	
Coals &c.	= 0.04	
	0.31½	
Balance	0.28½	
	0.60	

Very nearly 100 per cent! I charge the cake at 2 cents a pound, it ought to be 2½.

These are facts, and I followed out the system for 11 years. Things, however, are very much altered since those days. Men no longer feed by rule of thumb, and we are enabled to act by rule, in a way which would have astonished our fathers. M. Boussingault's well known experiment on pig-feeding is worth reciting as bearing out fully the fact of which I have been speaking: cost is not success. Two pigs, each weighing 132 lbs, were put up to fat; one was fed on potatoes alone, the other on pease, rye-meal, and hot wash from the house. At the end of 93 days the weights stood thus:

You observe that, though the second pig had eaten only three times as much as the first, he had increased more than six times as much in flesh! And if you will look into this question a little attentively, you will have no difficulty in understanding why it should be so. Let us begin at the beginning.

In speaking of plants (v. journal for December, p. 118), I said, that the active principles of which they were made up consisted of carbon, hydrogen, oxygen, and nitrogen. And exactly the same fact applies to animals; in truth, the identity is complete; starch, albumen, glucose, and fibrin of animal or vegetable origin are so closely analogous as to be easily mistaken the one for the other, as may be seen in the following table:

Proximate principles common to animals and plants.

	ALBUMEN		CASEIN		FIBRIN	
	Animal	Vegetable	Animal	Vegetable	Animal	Vegetable
Carbon	53.5	53.5	53.5	53.7	52.8	53.2
Hydrogen	7.0	7.1	7.1	7.1	7.0	7.0
Oxygen	23.7	23.3	23.6	23.5	23.7	23.4
Nitrogen	16.5	16.5	15.8	15.7	15.8	16.0

Thus, it is clear that plants and animals spring from a common base; and as the plant needs air and water, so does the animal. But do the requirements of either stop here? By no means: the first condition of both plant and animal is combustion. Heat, (3) furnished in the one case by the sun, in the other by the combustion of the food or of the tissues which are formed from it by the renovating act of vital labour.

And this food must not be of one sort only. To be thoroughly useful it must contain four different groups of matters:

(1) Pig on potatoes alone had eaten 1,173 lbs, and had gained 15½ lbs of flesh.

(2) Pig on mixed food had eaten 3,665 lbs, and had gained 101 lbs of flesh.

(3) The temperature of some kinds of lilies rises from 18° to 72° F. above the surrounding temperature. *Ville on chemical manures.*

Albuminoids | Carbo-hydrates  
Fatty matters | Mineral matters

Just as in the manures we have spoken so much about we found it necessary for plants to receive:

Phosphoric acid | Lime  
Potash | Nitrogenous matters.

If you suppress one of these substances you will find that the work of nutrition will receive a check that will almost invariably end in the death of the animal experimented on. A dog fed solely on washed meat—fibrin, soon shows a horror of the food; intestinal irritation supervenes, and he eventually succumbs. Carbo-hydrates alone do not succeed much better. Majendie, the first great vivi-sectionist, tells us that an ass he fed only on rice died at the end of three weeks. A duck fed on butter alone died in less than three weeks; butter, accompanied by a fetid smell, exuded from all parts of its body, and the secretions were almost entirely formed of fat. And even if one mineral, common salt, be suppressed, diseases will ensue, finally bringing about the death of the subject. Regular nutrition, which manifests itself by perfect health and an increase of weight, is to be realised only by means of the association of the four above-named constituents.

ARTHUR R. JENNER FOST.

De omnibus rebus et quibusdam aliis.

Sorghum.—The Washington Agricultural Department has been at work upon sorghum, and not too successfully. The syrup, 2,977 gallons, produced from 135 acres of cane only cost for cultivation and manufacture \$8,550! I am not often guilty of praising things old because they are old, but, agriculturally speaking, I cannot help thinking that we had better stick to our butter, cheese, meat and grain.

Hay drying.—There seems to be every desire in England to give the new system of fan-drying a fair trial. There is one thing against the plan and only one, as far as I have studied the question: twice the weight of stuff to move from the field to the stack. But, here, when haytime is on there is nothing else to press us on the farm, so horses and men are not wanted elsewhere. My brother writes me word that on our neighbour Lord Fitzhardinge's farm the system will be thoroughly tried, and he promises me a full account of the issue. My readers will remark among the extracts that one man who has worked the fan complains of the hay mildewing. As he carried the grass a week after cutting when it was wet with rain, I do not think he need feel much surprise.

Linseed-cake, I see, is quoted in Liverpool at £7 10 a ton for the best quality; and decorticated cotton-seed-cake at the same price = \$36.30 per gross ton; which is for our ton \$32.37. As the cake I speak of is sent from America to England, and the profit, freight, insurance and other charges are included, I do not see why prices here should be \$36 for cotton-seed meal, and \$37 to \$40 for linseed cake! All these things artificial manures, feeding stuffs &c. want looking into. Sulphate of ammonia still keeps up in the English market, but nitrate of soda has come down to 12s. 6d. a hundred. This must ultimately reduce the price of the sulphate of ammonia.

A. R. J. F.

Reverted or reduced phosphate.

When a heap of superphosphate has stood for some time it is often found that the amount of soluble phosphate in it is less than it was at first. Now, it would suit manufacturers very well if they could make out that this reverted or reduced phosphate was as valuable a source of phosphoric acid as soluble phosphate. Even if it were as valuable, it is not

what the manufacturer professes to sell or what we want to buy. What we ask for, rightly or wrongly, is a phosphate in a quickly soluble state. If we want more bi-calcic phosphate, which may be useful to carry on the crop towards the end of the season, we can mix a little fine bone-meal with the superphosphate and thus enjoy the advantage of a both a forcing and a lasting manure.

I see the attempt is still being made in the local journals to persuade people that our *apatite* ground into fine powder is the manure. Mr Jamieson, the agricultural chemist, is continually thrust forward as approving this method of treating it.

Mr Jamieson, it is true, recommends the use of finely ground insoluble mineral phosphate as manure for crops as being cheaper than the same dissolved, and in many cases, equally efficacious; but he "wishes it to be distinctly borne in mind that, when speaking of insoluble mineral phosphate, he refers to the well known *massive* form of phosphate of lime (coprolites), and not to *crystalline* forms of phosphate of lime." "Nor will," he adds, "our Aberdeenshire conclusions apply to *apatite*, or to phosphate of alumina and phosphate of iron, our experience of which is that their action is nil, or so slight and slow as not to be regarded as having manurial value." *Jamieson's report on Aberdeen experiments, 1881.*

Aitken, the chemist to the Highland Society, says the same thing of the ground *apatite*: "The plot with *ground Canadian apatite* was a failure from beginning to end of the season; showing that, *even when very finely ground*, this hard crystalline phosphate is unsuited for use in the undissolved state." And now, *Senex; J. C.; W. B.*; and others are gravely bringing forward Jamieson as an authority for the use of undissolved *apatite*, as the best form in which phosphoric acid can be applied as a manure. Have they all mills to sell?  
A. R. J. F.

## AGRICULTURE.

PARIS, APRIL 22.

Maize is largely employed in France for the production of spirits and starch: in both cases, the residue has an importance as an article of cattle food at once cheap and nutritive. The flour of all cereals in addition to starch, contains gluten, fatty matters, gum, mineral salts, &c. When the maize has been softened in water, it is carried up to a pulp engine and reduced to liquid paste; by successive screenings the starch is separated, and the residue is a yellowish mass, possessing an agreeable odor, capable of being preserved in trenches, and well relished not only by cattle, but by horses, pigs, and barn-door fowls. It contains, still, 8 per cent of starch,  $1\frac{1}{2}$  of gluten,  $2\frac{3}{4}$  fatty matters, and 7 of sugar. It can economically replace oil cakes; as 6 cwts. of the paste at 15 fr. is as nutritive as 2 cwts. of linseed cake at 23 fr. The secretion of milk is augmented, yielding not only a quality rich, but of an agreeable flavour. In the north of France, the farmers use the refuse of the starch mills very largely.

There is a warm rivalry going on respecting the nutritive and economical value of palm and cocoa cakes; nitrogenous matters predominate in the latter, and fatty substances in the former. For pig feeding, both cakes are mixed. In the centre of France, cocoa cake is generally employed for milch cows, the milk produced on this regimen is rich, and the butter fine and well flavoured.

In Brittany, Jerusalem artichokes, 23 lbs. per day ration, are competing with parsnips in the feeding of horses; they produce a sleeker coat, and the animals relish them better: then, they remain more juicy at the end of the season, when parsnips and carrots become dry and insipid. Parsnips demand a deep siliceous soil, and if near the sea so much the

better. The white carrot with the green neck, has the drawback of not keeping well; and, last winter being mild, their conservation was very difficult. To meet the difficulty, many farmers here cultivate the white carrot for first consumption, and the long red variety for later feeding-up to May, as it keeps well, and is highly relished, perhaps from its perfume.

Professor Sanson maintains, that the native breeds of live stock of France have been so improved by judicious crossings with imported pure races, as to be chemically and nutritively, in point of meat, superior to the latter. Be this as it may, stock breeders, and judges at agricultural exhibitions, display still a weakness for pure stock. Mr Sanson has analysed portions of the prize animals' flesh at the recent Paris fat cattle show, to determine the percentage of dry matter, of protein, and of fat, deducing therefrom the comestible value of the animal. Following his tests, in the case of stock, the Limousin breed would come first, and Durhams last; for sheep, precocious merinos, a deicester cross, and Southdown lambs. In the case of three breeds of pigs, the Normand and Limousin Yorkshires are superior to the pure Yorkshire. Allowing a good deal for patriotism, it is not clear what rôle difference of age has played in the comparison.

Professor Nocard, of the veterinary college of Alfort, has remarked, that many cases of the *charbon* malady were to be traced to lands dosed with such artificial manures, as blood, refuse wool &c. It is wise to take note of the observation without attaching to it undue importance. The Pasteur vaccination preventive against the *charbon* disease is now unanimously accepted in France: many local agricultural societies undertake to repay the expenses of vaccination to farmers who allow their stock to be operated upon; there has been no cases of failure where the instructions for operating have been faithfully executed. Up to the present, two descriptions of virus or pock were necessary to be employed; Mr Roux, one of Mr Pasteur's assistants, has tried a new virus, which insures immunity by one vaccination in place of two; it has been successful everywhere. Mr Tayon has conducted experiments with the virus on asses and mules in Africa, but these animals invariably proved rebel to all attempts at "taking" the vaccine. On the 11th May, a congress will be held in Paris to deliberate on the Pasteur principle being extended to other contagious diseases to which stock are liable.

This is more urgent as peripneumonia is the order of the day; inoculating healthy animals in the tail, with a virus taken from an animal which has just expired, has only yielded mixed results: gangrene, produced from irritation of the wound, or from impure virus, attacked the tail; the remedy was worse than the disease. Mr Pasteur has stated, that the peripneumonic virus, cannot be "prepared" like that of the *charbon*. However von Dorpat, of Germany, has prepared the former free from fatal impurities, by heating it for ten minutes at a temperature of 131° F.

Efforts have been made to produce machinery capable of extracting sugar from beet, on the farm even, and by the ordinary servants. Aprin, in the neighborhood of Paris, claims to have supplied the want: practical lessons have been given, and with fair success, at their works.

Mr Marguerite draws attention to the great waste of blood, when it can render such invaluable services as a manure. A preparation of iron, one quart to 20 of blood, will convert the latter into a cake, which when dried, either by pressure or heat, will readily pulverize and contain from 10 to 12 per cent of nitrogen.

The employment of superphosphates as a complementary manure up to the present, has found but little favor among tillage farmers of calcareous soils, in the south-west of France. M. de Gasparin, the eminent chemist, has investigated the

subject, and found, that when the phosphate was scattered on meadow land so as to be followed by a slight rain or heavy dew, the results were eminently satisfactory. The phosphoric acid in the superphosphate in question was in the state of phosphate of iron, but the acid is as capable of entering into vegetation in this state, as if combined with lime, iron playing an important part in the skeleton of cultivated plants. Conclusion. that in calcareous soils, superphosphates with base of iron, answer well,—a fact of immense importance.

Professor Marcker, of Saxony, recommends manures containing 168 lbs. of soluble phosphoric acid, and 66 lbs. of nitrogen per  $2\frac{1}{2}$  acres for potatoes. for sugar beet, the same dose of acid and double the quantity of azote. (1) Dr. Wildt, of Posen, recommends nearly the same formula.

Brewery grains constitute a valuable source of feeding for milch cows, especially when fresh, the difficulty is to keep them from becoming acid, as when in this state it affects the milk. Several processes are employed to preserve it, as drying and compressing into cakes; conservation, when well salted, in trenches &c. At Berlin a firm has been established, which mixes the refuse with bran, flour, peas, beans, &c., making the mass into a paste and baking as bread, the loaves recall, in taste and odor, fresh rye bread. The preparation readily dissolves in water, or can be mixed with chopped food. All animals relish it, and the milk from cows fed on it is excellent.

Mr Røber, a Swiss gentleman, has improved a winnowing machine for separating clover and lucerne seed from *dodder*. It is highly spoken of by independent persons who have witnessed its working. The seed passes through a series of movable drawer screens, and is brought up into a drum, after passing through a regulated current of air, which carries off the lighter seeds of the parasite. The machine can be adapted to purifying other seeds. A machine has been produced in Hamburg for making "wood wool," suitable for littering purposes, and claiming superior advantages over saw dust. It converts chips of every kind of wood used in work shops, into a sort of fibre or flock.

In the south-west of France, the sainfoin is attacked with a malady caused by a fungus, applications of sulphur after the first cutting are recommended. Mr Chevreul suggests a study of the changes effected in the composition of the soil.

The prospects of the beet crop are very brilliant, and the area of land under the root is this season largely in excess of previous years. For the success of sugar beet, the selection of good seed has become an axiom.

The vines begin to bud and leaf, so that in a few weeks, we shall be in a position to determine the new progress made by the phylloxera. Vineyard proprietors struggle energetically against the malady. It is proposed to apply the 300,000 fr. voted by the government some years ago for the discovery of a perfect cure, to supplying sulphuret of carbon &c. at a reduced price. It has been remarked, that when American stocks are employed, care should be taken that their origin will coincide in point of climate with that wherein they are to be employed. The wheat crop is excellent, the only danger to be apprehended is a too rapid vegetation.

#### DRAUGHT HORSE BREEDING.

During the next six weeks the minds of many farmers will be exercised as to the choice they should make of a draught stallion for the coming season. If not, then it ought to be, for there is no better source of revenue to the farmer just now than the raising of good draught horses. We say good because inferior animals will not sell in any market. In the

(1) Nitrogen.

north, the breeding of horses for draught purposes has long been studied, and, as is well known, to considerable profit.

The growth of city traffic having greatly increased, a market not originally contemplated by those who made horse breeding a business, has led to great strides within the past few years in this branch of rural economy, and now the men of the south thoroughly aroused to the fact that they have too long neglected it, are doing their utmost to make up the lost ground.

Of the three well-recognised breeds, the Clydesdale, the Shire or Draught horse—it is a pity, for the sake of euphony, the latter name was not adopted—and the Suffolk, the former is held in preference by the foreigner, either of America or Australia. He is not the favorite by any mere accident, as the introductory history to the first volume of the Clydesdale Stud book shows, but is the reward of perseverance in a right direction. Fifty years ago he was not such a big horse as he is now, his size having been much increased by the introduction of blood from the south, but his ancient characteristics—broad head, full eye, flat bones, and elastic yet strong pastern—have all been preserved. It has been said by the Shire horse breeders that he owes many of his best qualities to the Shire horse. It has to be kept in mind, however, that the hitherto meritorious points of the Shire—upright shoulders and steep pasterns—were the very reverse of those of the Clydesdale, and when a breeder did go south from Scotland, he always brought back an animal stronger a little in bone, with more hair about the leg possibly, but in nearly all cases possessing sloped pasterns. Not infrequently, the animals brought back were crosses from a Clydesdale stallion sold into the Shires; Scotch breeders to this day following in the wake of favorite animals which they may have sold to go South.

It is difficult to write about the Shire horses as a breed, there are so many different types, and all have their admirers.

The nearest approach to the Clydesdale in form is the Shire horse of Worsley Hall, which, possessing greater size and substance, lacks, however, in the northern men's eyes, in pastern, and which fault, together with wide hook action, would get them thrown in nearly every northern show ring.

The street horse of Glasgow, is however, sometimes so faithfully copied as a standard, as the roads are not so steep in the southern towns, and the journeys, generally so long that no single horse could well do the work. A pastern sloped so much as that which the streets of Glasgow demand, for instance, is not so necessary in London, where the gradients are not very steep. As to the average London horse, it is apparent at a glance that he would be of no use in the northern towns, his shoulder and pasterns being too straight to let him get away well going up hill. There can be no doubt, therefore, that the mechanism for draught purposes of the Clydesdale is the more correct; and the Shire breeders seem to be of that opinion themselves, as several of them, writing on the subject lately, advocate the sloped shoulder as against the steep one, and greater elasticity of pastern.

In America the newly formed Clydesdale Horse Society have appointed a Committee to draw out a scale of points for this noted breed of horses. It will be interesting to see what they will award for certain of the points which are considered indispensable here, viz., healthy sound feet, pasterns, and action, which may not be necessary there. The points will of course be those of any good draught horse, with a percentage thrown in for the genuine characteristics of the breed which are still apparent in the old stocks. If the scale is not rightly laid down, it will be unfortunate, as breeders on this side respect too much the foreign buyer, and are swayed by the reports of large prices being given for particular stallions or mares, forgetting that the best market is after all the home one for animals of medium price for street purposes.

It is, indeed, a little unfortunate that the requirements of direct contractors are not studied, a little more than is at present the case, farmers either going by their own plough and cart standards, or the wealthy foreign or colonial merchant, who wants great weight of bone, in numerous cases altogether regardless of its quality. The frequent quotations in the stud columns of the agricultural press have in numerous cases another bad effect, viz., the stimulation of the hopes of farmers who do not possess the proper sort of brood mares for raising big, strong, and high-priced stallions, to put them to high-priced fashionable sires. The result in many cases is naturally the very reverse of what was expected. A small, compact, clever little mare is put to a great big horse, instead of an average sized one, and the produce is a leggy nondescript. Thin-legged mares are put to thick-legged stallions, and the happy medium is expected in the very first cross, as if Nature is to be bribed to go out of her course with a big service fee and a tip to the groom.

The size of the mares, the soil, also the climate, should be considered in selecting a stallion. If the mares are small and well suited for farm work, then the breeders should not try to catch the city dealer all at once. Small compact horses are increasing in demand every day, and the market will form quicker for the breeder of such, and readier than he will form his stock for the market. For most farm purposes, too, the dray-horse is too heavy; and a medium-sized agricultural horse, suitable for "chain" work in streets, is a class which is bound to be formed in time, so soon as the mania for breeding heavy horses subsides.—ARGUS.

#### The Walk of Agricultural Horses.

I return now to my letters, and find that a great authority both on Suffolk and Shire horses, writes:—"Pace and action are very essential, especially walking. To obtain this, I think the length of the fore-arm and pastern has much to do with it—quite as much as the shoulders. Whatever height the animal may be, the knee and fetlock, hock and fetlock, cannot be too close together; the length of the leg should be in the arms and thighs, which should be well developed and full of muscle—the pasterns oblique (not upright and short, nor too long).

The shoulders should be fairly back, down well to the chest and full of muscle to the withers, which should be low, and not fine and narrow. A horse thus formed can both move and draw, I think.

Next I find the ideas of two rare practical judges, ex-masters of fox-hounds. (1) "Cart-horses with straight strong shoulders are good as timber horses—to start a heavy load or to pull a railway truck. They cannot travel on land or road at a very good pace, and go safely in ruts. But a strong short backed and well ribbed-up horse is of more consequence than a good-shouldered horse for farm work. Straightness of shoulder produces all sorts of lameness in riding or driving horses; but it does not produce the same lameness in cart-horses. From having sudden weights in heavy soils, &c., to draw, nearly all their lameness is behind, from weak back and loins throwing undue weights on the hocks. Of course I am not speaking of horses with brittle feet or bad feet, which go lame with straight or with good shoulders equally. Another thing which affects straight shoulders is the difficulty to fit collars so as not to chafe. Of course all straight-shouldered horses have in a certain degree short necks, which rather favour the existence of extra power in draught work. Upon the whole, fine shoulders are more suited to horses engaged in road and street work than for agricultural horses, and are more necessary."

#### HEAVY SHOULDERS

(2) "I have heard people argue about shoulders in cart-horses, and when I farmed largely I noticed most clearly to

my own satisfaction, that upright shoulders were no advantage and always found that right action was as needful to a draught horse as to any other, both in lasting endurance, and in getting over the ground. Walking is the pace to look for in a cart-horse. Judges are too apt to look to trotting action, and overlook the walking. Strong muscular—what hunting men call heavy—shoulders are wanted, but the more laid back the better."

A rare good judge, and one who farms largely himself, says:—"I do not believe in steepness of shoulder being conducive to draught, and if the animal who has it does have knee action it must be of the pounding sort. A cart-horse must have a strong shoulder, but I consider it should be a sloping one, and then the action (the more in reason the better) will not only be free and good, but will in any pace get over more ground than the steep shouldered horse. I am sceptical about the advantage of enormous heavy-heeled horses for tilling the land. I like to see a nearly clean heeled horse with short cannon-bone. In fact, the nearer a cart-horse can keep to an enlarged cob the better."

#### GOOD HIND LEGS.

Another great successful breeder writes (once a Suffolk man but now long resident in *partibus infidelium*):—"A horse with upright shoulders will not compare in walking with a big load on the roads (with ease) with the strong and sloping-shouldered horse. Horses with thin and upright shoulders may be better for farm work, on soils not too heavy, than heavier horses; but they sadly want activity to lift along a load. Depend on it, no horse can be active with bad shoulders, nor with good ones, if his hind-legs are not well formed. They are all the secret of comfort in riding, pace in driving, and power in pulling."

Next a Clydesdale breeder "approves of the oblique shoulder in the draught-horse, as it gives freedom of action, and does not interfere with his drawing-powers in any kind of work.

There is another point in the draught-horse that the majority of English and Scotch men do not agree about, and that is the pastern. The most successful exhibitors and breeders, however, in England and Scotland are of the same opinion, that it is one of the most important points. They should be lengthy, with a proper slope, springy and strong. My reason for using the term lengthy is, that I hardly ever saw them too long, especially in England. As a proof of the difference of opinion about the draught-horse in England and Scotland, I believe that there were very few, if any, that gained prizes singly at the Royal at Carlisle would have gained a prize at all at the Highland Society or any of the leading shows in Scotland principally on account of their short, stiff, upright pasterns."

#### OUR ENGRAVINGS.

*Hampshire-down ram*: of this useful breed I have so often spoken, that I will only say that the legs of our model are rather longer than they ought to be.

*English dog-cart horse*: a fine specimen of the useful and lasting Norfolk type—the horse from which our engraving was taken was 15 years old when he stood for his portrait.

*Shotover*: winner of the Derby of 1882. The mare is the property of the Duke of Westminster, who won the same race in 1880, with Bend Or. The course is 1½ miles, and the horses carry 8 st. 7 lbs. = 119 lbs. Only two mares had previously won this great race during the century which has elapsed since its establishment.

*Poland—China Boar*: probably a mixture of China and Berkshire and Chester. White; good fatteners, but lean-meat is wanted now-a-days, and the Berkshire fattens quite quick enough and distributes its fat and lean more equally.



*Matchless the 5th*: a splendid example of the true short-horn dairy-cow. Her owner, Mr Tisdal is a large dealer in milk, and has secured an extensive herd of shorthorns of both pedigreed and unpedigreed sorts.

## Poultry Department.

### Poultry Farming.

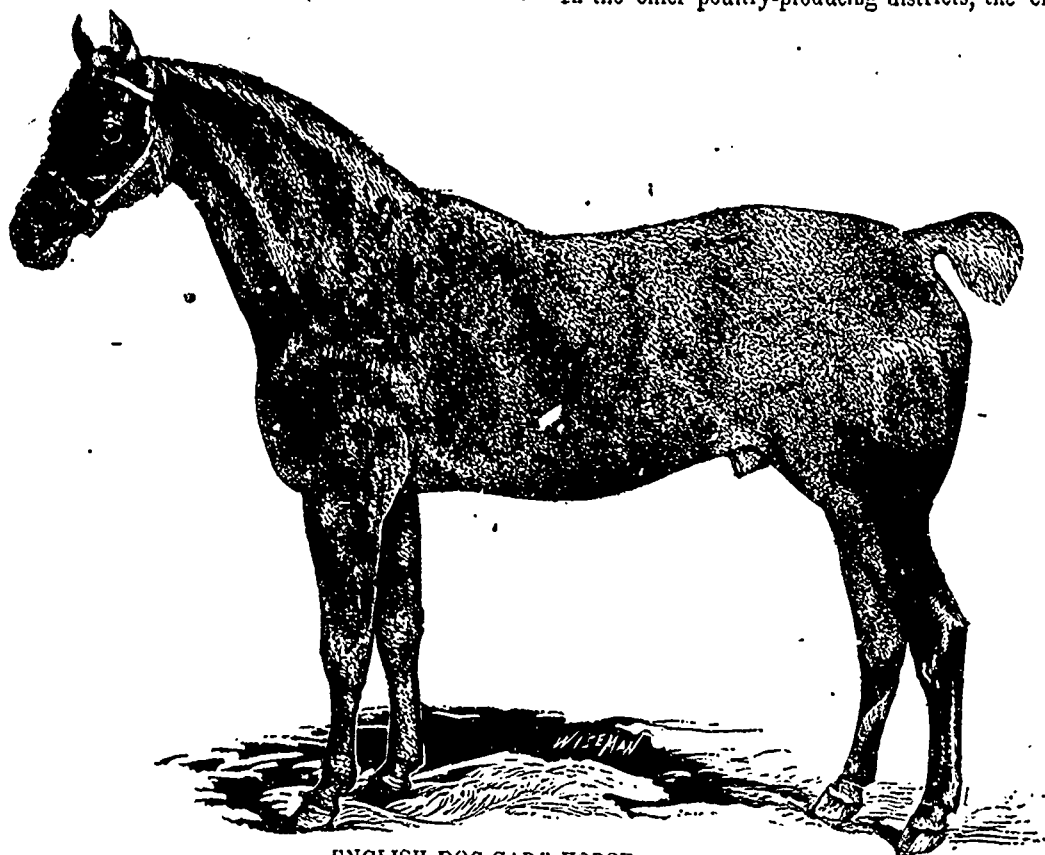
The attention of the public has of late been frequently directed by articles in the agricultural journals, and by pamphlets, as well as by distinct works, to the supposed advantages of poultry-farms and the profit to be obtained by poultry-farming. These articles are generally based upon the undoubted fact that we import from France an enormous number of eggs, and upon the equally erroneous supposition that these eggs are produced at large poultry farms where many hundred or even thousand head of poultry are kept together.

Recently a great amount of attention has been devoted to

culture in France; and the result of their inquiries, pursued in the various departments for several months, is that there are no large poultry-farms whatever in France. There are several establishments where large numbers of chickens are hatched and sold at once to the peasant proprietors, being sent away by rail in small boxes as soon as they are able to travel. This can be readily done, as they require no food for twenty-four or thirty hours after being hatched, during which time they are digesting the yolk which is drawn into the intestines at the end of the period of incubation.

In the ordinary farms in France, even those in the best poultry districts, from 200 to 300 head of fowls are kept at one homestead. If a larger number are maintained in one spot, the ground becomes "poisoned" or tainted, and success in rearing the chickens is almost impracticable; consequently, amongst the smaller peasant proprietors, almost all of whom keep fowls, there is a constant competition to obtain fresh ground for their poultry.

In the chief poultry-producing districts, the chickens are



ENGLISH DOG-CART HORSE.

the production of artificial incubators, M. Voitellier, who has been followed by Mr. Christy and others in this country, having advocated the use of an incubator in which the heat is supplied by the addition of boiling water twice a day to a cistern containing a large bulk of fluid. This cistern, being surrounded by non-conducting materials, maintains its temperature for many hours without much loss. These incubators and artificial rearers, whose warmth is maintained in a similar manner, are now recommended as furnishing the ready means of stocking large poultry farms; and the method of procedure in the poultry-farms of France is held up as the example to be followed.

During the present year, several practical agriculturists have been investigating the progress and present state of agri-

generally hatched under young turkey-hens, about two dozen eggs being placed under each hen. When these are hatched, a second batch of eggs is given to the hen, and this is sometimes repeated a third time, or even a fourth time.

The chickens, when hatched, are given in large numbers, sometimes as many as eighty, to another turkey-hen. Coops are rarely seen, but the hen and her brood are driven along the road or to some covert by the old women, with slender poles, who will carry their knitting or other work, and watch their charges all the day long.

The chickens, when mature, are fatted on barley-meal, and, what is still better, buckwheat-meal, and being usually of fine-boned white skinned varieties, such as Houdans, La Flèche, or La Bresse breeds, realise high prices in the markets. Ca-



SHOTOVER; WINNER OF THE DERBEY, 1882.

ponising is often had recourse to: it is performed according to the following instructions, which are taken, with some alterations suggested by my surgical experiences, from a work by Mdlle. Millet Robinet, "Oiseaux de Basse-cour."

"It is desirable to submit the cocks to the operation when they are about four months old, and it is very important to choose a time when the weather is somewhat cool, rather moist than dry, and especially to avoid performing the operation during the great heats of summer. The instrument employed in the operation should be very sharp; a surgeon's small operating-knife, termed a curved-pointed bistoury, is far better than an ordinary knife, as it makes a much neater wound, and so increases greatly the chances of healing; or a curved-pointed penknife may be used. A stout needle and waxed thread are also requisite; and a small curved surgical needle will be found much more convenient in use than a common straight one. The fowl should have had no food for twelve hours before the operation.

"It is necessary that there should be two persons to perform the operation. The assistant places the bird on its right side on the knees of the person who is about to operate, and who is seated in a chair of such a height as to make his thighs horizontal. The back of the bird is turned towards the operator, and the right leg and thigh held firmly along the body, the left being drawn back towards the tail, thus exposing the left flank, where the incision has to be made. After removing the feathers, the skin is raised up, just behind the last rib, and an incision along its edge is made into the cavity of the body, sufficiently large to admit of the introduction of the finger. If any portion of the bowels, escape from the wound it must be carefully returned. The forefinger is then introduced into the cavity, and directed behind the intestines towards the back, where it comes into contact with the left testicle, which in a young bird of four months is rather larger than a full-sized horse-bean. It is movable, and apt to slip under the finger, although adhering to the spine: when felt, it is to be gently pulled away from its attachment with the finger and removed through the wound—an operation which requires considerable practice and facility to perform properly, as the testicle sometimes slips away, and, gliding among the intestines, cannot be found again readily; it may, however, remain in the body of the animal without much inconvenience, although it is better removed.

"After removing the left testicle, the finger is again introduced and the right one sought for and removed in a similar manner.

Afterwards the lips of the wound are brought together and kept in contact with two or three separate stitches with the waxed thread: these must be made through the skin only.

"In making the stitches, great care should be taken to avoid wounding the intestines with the needle, or including even the slightest portion of them in the thread—an accident that would almost inevitably be followed by the death of the animal.

"After the operation, the bird had better be placed under a coop in a quiet situation, and supplied with drink and soft food, such as sopped bread. For a short time it should not be permitted to roost on a perch at night, but be turned into an empty room, where it is obliged to rest on the floor, previously covered with some clean straw. For three or four days after the operation the bird should be fed on soft food; after that time it may be set at liberty for a short period, until it has recovered entirely from the operation, when it should be put up to "atten."

Recently, an American mode of operating has been recommended; it is performed on much younger chickens, but I cannot recommend it, the birds suffer much more severely from it, and some that have been operated upon by a veteri-

nary surgeon, who has had extensive practice, have been dissected by myself, and have proved to be not capons at all, the organs remaining in position, although the ribs gave evidence of the nature of the operation, being bent and dislocated.

The cause of the large production of poultry and eggs in France is not far to seek. The country, owing to the land laws that prevail in the Republic, is divided into innumerable small holdings, and each peasant proprietor can keep his stock of fowls without overcrowding. But in our own country, where large farms prevail generally, and where there is one homestead to perhaps several hundred acres, only a moderate number of fowls can be kept, or the ground will become overstocked.

The London market is supplied with its best fowls by the feeders who collect the young birds from the labourers and others, who each keep a few hens, and then fatten them, after which they are killed, plucked, and brought to London.

A farmer sending a few birds at a time to a London salesman cannot rely on receiving back a satisfactory return.

In fact, I never heard of one who did so; and unless some more direct channel of communication between the poultry producer and the consumer than now exists is established, I do not see that the sending of poultry in small numbers to the metropolitan markets is ever likely to pay. The system that appears the most promising is that of the sale of the young birds alive to those who make a business of fattening.

"In France the labour is divided—the *acouveurs* hatch the birds, the *fermière* rears them, they are bought and fattened by a third person, and die by the hands of the *tueurs de profession*.

In England there is no such organisation; and, if there were, it would be the small peasant holders who would benefit, each to the extent perhaps of a few pounds per annum."

In conclusion, I would state that, strongly as I recommend a good head of poultry as a profitable adjunct to every farm, I cannot but regard poultry-farming, considered by itself, or on a large scale, as a mere delusion.

Nor is my opinion without the sanction of experience. I have now lying before me a list of twenty such establishments, that have been tried under various conditions, and with every advantage of capital and labour, in different parts of this country, but have all ended in disastrous failure; and I do not now know of the existence of any poultry-farm, properly so-called, in any part of the United Kingdom.

The inference to be drawn from these facts is obvious.

I have for some years paid much attention to the breeding of table-fowls, and, since the above was written, have taken the prizes offered at the last Crystal Palace Poultry Show for the best table-fowls; smallness of bone, absence of offal, closeness of plumage, plumpness of breast, and quality being considered. The birds I exhibited were bred from large dark brown-red Game hens and a short-legged Dorking cock. The young cocks, at six months old, averaged seven and a half pounds each, without ever having been shut up or fed on soft food of any description. Running in a wood, and given as much corn as they would eat three times a day, they were as plump as pheasants, and trussed well. Never having been cooped, they were perfectly hardy, not one out of some sixty or seventy dying of any disease.

I may state that the birds obtained by crossing a large Game cock, of the same strain as the hens used by me, with good Dorking hens, were by no means equal to those I produced from the Game hens and the Dorking cock, Tegetmeir.—*The Live Stock Journal*.

Table-fowls are all the rage at the season of merry Christmas. It seems to us a suitable opportunity to record the fact that

the present exhibition of dead poultry at Leadenhall Market has never been equalled in this country before for quality and weight. It is also the opinion of Mr. HOWARD'S salesmen that they never saw finer specimens of Dorking capons than have been sent up this year. Mr. A. GLOVER of Lingfield has sent twelve that there is hardly a pick between, weighing 13 lbs. each, and all that is asked for these fowls is 10s. each. Such fowls in Paris at the exhibition would easily command 30s. each, ordinary times in the Paris market a guinea each. Next comes Mr. E. LEWRY of Bolney, Sussex, who has sent up 250 capons, running from 9 lbs. to 13 lbs. each, splendid birds, but not so beautifully prepared as Mr. GLOVER'S twelve. His brother, Mr. JOS. LEWRY, has also sent to this market 180 capons, running up to similar weights, all of the Dorking type. There is no doubt that if these had been manipulated in the way the French dressers adopt, such a sight would never have been seen in France at any show. Speaking generally, the turkeys this year in the markets are of a very fine quality, and very well prepared for market.

*Live Stock Journal.*

of the greatest importance, as large growers of hay object to so small a stack as 20 feet square, and many more would have tried the system if ordinary sized stacks could have been used. I consider 30 feet square stacks must be square or round) perfectly safe, and should not fear building one even larger; it could be worked equally well, but would take considerably more time. No one who has taken the trouble to inquire into this system of drying hay can doubt its success if carried out with ordinary care; and I fully believe it will be even more useful for corn, especially oats, as it can be carried before being thoroughly dry, and thus save the great loss in shattering.

This matter is so important to my brother farmers, that I consider no trouble too great to extend the use of the fan; anyone can therefore see it here, who will kindly give me notice of their intended visit, naming day and hour (not later than 12 o'clock when possible), when I or my bailiff will explain all the details. Wednesdays will not be convenient.—JAMES NORRIS, *Cattle Hill, Blechingley, Surrey.*

THE HAY HARVEST.

I have put in operation to-day one of the Neilson fans for



POLAND-CHINA-BOAR.

**Agricultural Machinery**

**HAY-DRYING.**

One great difficulty connected with the Neilson system of drying hay having been got over by the introduction of fans worked by hand, I have tried to obviate the only remaining one, viz., the smallness of the stacks which were considered necessary. I felt that much larger stacks might safely be built but did not like to recommend anyone to try them till I had made the experiment. I have just carried 40 loads of hay from a 24-acre meadow, which has been put on a stack 27 feet square, and on which I intend to put about 12 loads more. Twelve loads were carried on Monday, 17 on Tuesday, and 11 on Wednesday. Three thermometers were placed on different sides and elevations of the stack; this morning (June 15) they registered 100°, 120°, and 130°, the difference being caused partly by the high wind last night, and partly by the length of the thermometer cases. One of Marriage's fans was worked for sixteen minutes, and reduced the heat, as shown by the different thermometers, by 9°, 16°, and 9°. This difference I again attribute to the distance the thermometers were placed in the stack, as, of course, the middle was not so quickly cooled as the outsides.

The increase in size of stacks which can be operated on is

harvesting hay. The grass is a very heavy crop—over 2 ton to the acre—and was mown and carried during the bad weather of the last few days. At the time the machine was put into operation, the temperature of the rick, inside, was over 140° Fahr.; the fan had only been in work a few moments when steam was issuing from the mouth of the machine almost as strong as if it were the exhaust pipe of a steam boiler. This system is likely to be of such incalculable value to the farmer, that I think it is the duty of everyone to make it as widely known as possible. I shall be very pleased to show it to anyone interested who may come.—G. Mander Allender, *Member Council Royal Agricultural Society, Solna, Rochampton, S. W., June 15, in the "Standard."*

**HAY-DRYING.**

This is the subject of the month. It must be done somehow, and if sun and wind should fail us, as latterly they have done, we must look to artificial aid; and Mr. Neilson's method, in which the necessary heat is obtained not from purchased fuel but from the heating hay itself, will no doubt be largely tried. Mr. Allender already reports his success, and our readers will find his letter, and one from Mr. Norris in another page.

The plan to be adopted is to put the hay together in round

ricks of ordinary size after it has been shaken out and gathered into cocks at the end of a day's wither. It will still be unfit for rick—certain to heat, and even to catch fire; nevertheless, that is the condition in which we put it together. There will probably be twice as much weight to carry as if it were dry enough for hay. The 8 or 10 ton per acre has become 4 or 5 ton by a day's drying. In other two days it would be hay weighing 35 to 40 cwt. per acre. We put it thus together with at least an equal weight of moisture in its midst. We build it over a hole in the ground—we make that hole reach upwards into the middle of the rick—and we connect it with an underground horizontal 9 inch pipe, terminating outside in one of the exhaust fans which are advertised. In a few hours after ricking it will heat. You then pierce it with a rod having a protected thermometer at the end, and, pulling it out in a few minutes, you read the temperature. As soon as it reaches 150° Fahr., set the fan to work, and out will pour a volume of heated vapour, and the rick will gradually cool down. Let it heat up to 150° again, and draw a lot more vapour from it. In a couple of days, with repeated exhaustion in this way of the vapour, to which wings are given by the heat, the moisture is extracted—so much, at any rate, as is necessary in order to convert still sappy grass into hay. Let your ricks be built in every case over one end of a horizontal pipe in the ground, and, then, one fan carried from rick to rick, applied successively to the other end in every case, will suffice for a large number of them.

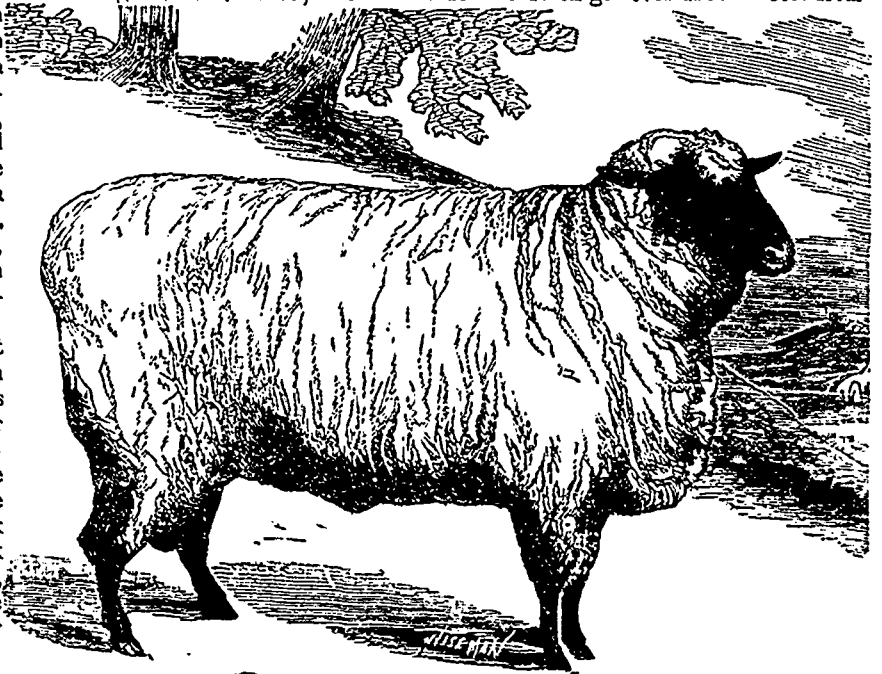
Those who have been using exhaust fans successfully, tell us that they can be used even though the atmosphere is loaded with moisture, stacks even under unfavourable circumstances being reduced by them to the proper temperature after each successive heating, until the hay is thoroughly made and the rick is safe for the winter. And if the rick is made under the roof of a hay barn, or even under canvas, the fan may be kept going efficiently even on a rainy day.

Nor must we forget that in scorching seasons the loss from sun-burnt hay is considerable, and this loss, too, can be obviated by the use of exhaust fans. It is virtually a drying wind by which we thus make hay, for air which is saturated with moisture at a temperature of 70° outside, is a drying wind when raised to 150° or 170° inside the rick through which it is being drawn. Let us acknowledge, however, that an apprentice fee will, in all probability, have pretty frequently to be paid before all the details of successful practice are perfectly learned. *The Agricultural Gazette.*

#### HAY-DRYING.

The following letter from Mr. C. H. Toulmin, Chelsham, Croydon (delayed on its passage), reaches us just as we go to press:—"I have studied these machines since the accounts appeared in your columns and those of the *Field*, and as a beginner at farming, and also as to the use of the fan, I thought it might be interesting to your readers to hear my experiences. About six weeks ago I availed myself of Mr. NORRIS' permission to visit his place and see his fans working. I ordered one from Messrs MARRIAGE & Co, and laid my pipes from two 20 feet square stack bottoms, having separate outlets close together, to avoid moving the fan far. My thermometer

box is badly made, and I fancy it does not give the correct temperature, it not being air-tight. I commenced stacking on the 7th, and for the first week worked by the temperature at the mouth of the fan, which was about 120°. I connected a small engine to the fan, and decreased the heat 2° per hour it rising at the rate of 3° per hour when the fan stopped. I am now working by the thermometer in the box, and by working for two hours this morning reduced the temperature from 150° to 90°. Can anyone tell me why the heat at the fan is so much greater, and keeps such a steady temperature? it has only gone down 4°, while the thermometer in the box has gone down 60°. As to the stack, it is composed of ryegrass and clover, and is 15 feet square, rising to a point at the top. The grass was carried a week after cutting, and most of it in a hard rain. The stack stands facing the north-west, and the wind has been blowing nearly the whole time direct west, cooling the stack on those sides, the other sides being so hot I could not bear my hands in more than a few inches; this has made the stack go over about 2 feet from



#### HAMPSHIRE-DOWN RAM.

the top. To make it a little more shapely, I have cut down the side, but it is still very warm, and there is a large appearance of mildew about the stack. I am now working the fan morning and evening, but the temperature rises during the day and during the night to 150° or 160°. Each time I reduce the temperature to between 80° and 90°. I should like to hear an opinion on my work, and should be glad to show any one the stack with fan at work which I propose continuing until the stack keeps a regular temperature."

#### HAYMAKING IN THE STACK.

Under date of June 17th, Mr. James Peter, farm steward to Lord Fitzhardinge, wrote as follows to Messrs. R. A. Lister and Co., of Dursley, the patentees of the new portable exhaust fan for drying ricks:—"I am pleased to say your exhaust fan is a great success. I made a green rick on purpose to test it, put together half dry. It soon reached a temperature of 150 degrees. I applied your fan by hand, and reduced the temperature to 95 degrees in less than ten minutes. You ought to come and see it work. I shall not be afraid of the weather now in haymaking."

HERBERT JENNER FUST

**Cooling Hayricks by Fans.**

Dear Sir,—It may interest some of your readers to know that a fan made by Mr. Lister, of Dursley, has been at work here all this week.

In order to put it to a severe test, a small rick of about ten loads of my wet grass was put together last Saturday. This had been cut three days, but there had been rain on it daily. There has not been the least difficulty in keeping the heat down to 100 degrees by the application of the fan two or three times a day for five minutes at a time.

Whether grass put together in such damp condition will be of good quality when cut out for use we shall not know for some months to come; but the efficiency of the fan to control the temperature of ricks so put together is beyond all doubt.

Yours very truly,

W. P. PRICE

Tibberton Court, Gloucester, 26th June, 1882.

My Dear Jenner Fust,

The crops about here look splendid at present, and if we can only have a little less rain and more sunshine and warm weather the harvest ought to be truly magnificent—only the

**The future of Sugar-factories in Canada.**

M. Bolikowski, a civil engineer, chemist, and sugar-maker, of Noailles, France, has lately favoured us with a visit. Thoroughly versed in the manufacture of sugar, which he has practised in Poland, his native country, in Russia, and in France, the reputation of this gentleman is European; and, on that account, his opinion as to the prospects of the sugar-factories in our province is most valuable. After having seen the factories at Berthier and Farnham, as well as the extensive acreage of sugar-beets cultivated by the honourable M. Marchand, at St. John's, M. Bolikowski stated to us as his firm conviction, that the province of Quebec was admirably suited to this pursuit, provided always that the management was entrusted to trustworthy men; to men perfectly acquainted with the cultivation of beets and their conversion into sugar; and, provided also, that the capital was amply sufficient for the intended purpose. M. Bolikowski considers that the factory at Berthier is well arranged, and he esteems the Farnham establishment a model one, which would confer honour on any country where this industry is practised.

An appreciation like this—at once disinterested and enlightened, should encourage us to do our best to assure the final success of this industry, which, up to the present time, has suffered great drawbacks from various fortuitous occurrences.

**New Sugar-factories in Germany.**

From the *Deutsche Zucker-industrie*:

"During the last season, 15 new factories have been started; and, next year, probably, 18 more will go into operation.

Besides these 18, which will be ready for work before the sugar-making season begins, we may mention projected ones to the number of about 30, which our Berlin contemporary mentions by name and by province.

Reckoning all these, the *Deutsche Zucker-industrie* estimates

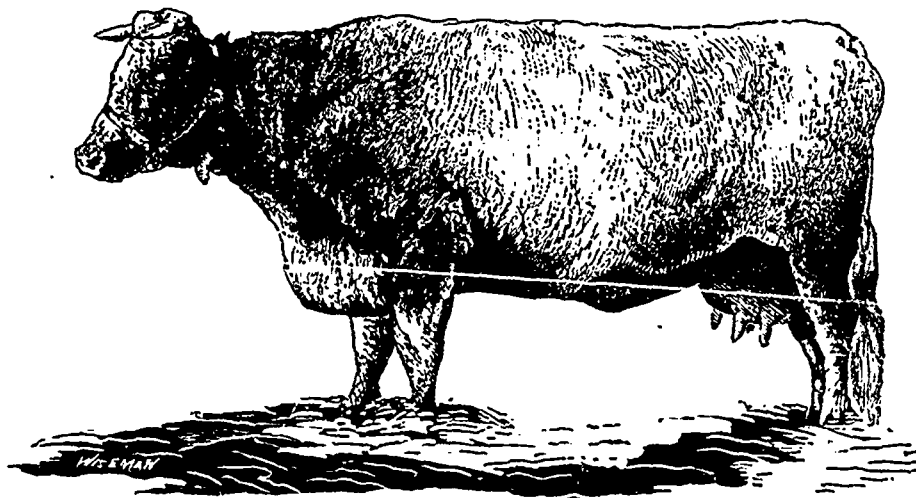
the quantity of beets that will probably be worked up in Germany, in the season of 1883-1884, at about seven and a half million tons. that is, the German production has doubled in four years! The increase of production in Germany is even still more important than the establishment of these new factories would indicate, for the old ones have added considerably to their powers of production, and the yield, thanks to the improvements in cultivation and manipulation, tends to increase every year.

From the French.

**WEST FARNHAM, CANADA.**

The bounty of \$70,000, offered by the Quebec government for the establishing of a beet-sugar factory in a locality selected by one of its officials, is to be paid to West Farnham factory. We are informed that the House of Parliament has voted that \$25,000 in cash be paid this year. In other words, the provincial government has signified its intention of making the West Farnham factory a success. In order to increase its facilities, the company has issued a "preference stock" to the amount of \$150,000.

The prospects for this year are very bright. Up to the



MATCHLESS THE 5TH.

hay crop will be under the average, being very short and a great deal of the young hay sown last year has been destroyed by the want of snow last winter, which allowed the frost to kill it in a great many places.

The wheat about here is very fine. I have a field in front of my house which is as fine a field as you would wish to see anywhere, fine, heavy ears and about 4½ feet high. My only fear is that all this rain will cause it to lodge. Oats are looking well, so is barley—pease also in most places make a good show. Potatoes coming on well and are not much troubled by the potato bug as yet. My roots look very well, all having come up, the difficulty being the rapidity of the growth of weeds and not being able to clean them as fast as I could wish, owing to constant rain; the turnips especially look well, not having been eaten by the fly.

As you will gather from this, we have no reason to complain so far. Should you want any further information, please let me know, and I shall be delighted to tell you all I can.

Yours truly,

E. A. CAMPBELL.

St. Hilaire, 13th July, 1882.

time of writing, about 1,000 acres have been contracted for, 500 acres of which are taken by four syndicates: one contracts for 200 acres, two for 100 acres each and two 50 acres each. The balance of the contract is with farmers on areas of one-half to five acres. If the company had intended working its full capacity, 250 tons a day, there would not have been the slightest difficulty in obtaining the desired quantity of roots. But it was, for the present, considered advisable to wait for the third campaign before attempting the handling of some 30,000 tons of roots. No effort will be made by the company this year to grow beets. It is considered advisable, as far as possible, to devote its entire time to working up the roots, which, in itself, is an undertaking requiring every possible attention. It must be said, however, that in some few years hence the conditions will be changed, and the objections now justly offered will no longer prevail.

The provincial government has offered for two years a bonus of seventy-five cents per ton on beets raised by the company. The contract with the farmer specifies that \$5 a ton of 2 000 pounds be paid for roots delivered at the factory, or \$4.50 f. o. b. cars, when the contracts are small, say from one to five acres; but to syndicates who contract to raise from fifty acres and upwards, \$550 delivered at factory, or \$5 f. o. b. cars. Our readers will readily understand that by the above arrangement the neighboring farmers are induced to grow roots, as they would with but little trouble realise fifty cents more for their beets, than those who contracted with the company at distances too great for transportation by horse and wagon. On the other hand, if money can be made in growing small areas in beets, it necessarily can when on a large scale, as the facility of working, by improved agricultural implements, is very much greater. The bonus of fifty cents per ton will encourage the growing of hundreds of acres. The West Farnham Company has promised us regular information regarding its workings, and we are convinced that, when published, this will be of interest to our readers.—*From The Sugar Beet, a Philadelphia journal.*

D. Landreth & Sons, seed growers and merchants, offer \$100 for the five best essays on Celery Culture, the sum to be divided among the authors of the five best articles, in the following proportions: \$40, \$25, \$20, \$10 and \$5. All the prize essays will be printed together in pamphlet form.

D. Landreth & Sons, seed growers and merchants, offer \$125 for the six best essays on Onion Culture, the sum to be divided among the authors of the six best articles, in the following proportions: \$40, \$35, \$20, \$15, \$10 and \$5. All the prize essays will be printed together in pamphlet form.

We shall be anxious to know the names of the winners of the prizes so liberally offered by Messrs Landreth and Sons, of Philadelphia, for the best essays on the cultivation of onions and celery. Unfortunately the programme did not arrive at our office till the July number of the Journal was printed; and, thus, we were prevented from giving our readers a chance of sharing in the competition.

Mr. Watson, late of Keillor, on "the rearing of calves."

The following is a contribution by Mr. William Watson, late of Keillor, which may be taken as a supplement to the paper which we extracted from the *Dundee Advertiser* the other week on "The Supply of Lean Cattle."—

If your object is beef, the calves should be dropped during the months of December, January, and February; for winter-reared calves always thrive best. This system, of course, can only be carried out on farms where there is good shelter; and it is to farmers so situated I particularly address myself. I shall draw attention first to hand or pail feeding. Nothing is more important or conducive to the successful

rearing of calves than proper house accommodation for the purpose. Calves should either be tied up or put in loose boxes when pail-fed—in boxes that hold only one calf each, to prevent them from sucking one another, which often does them much harm, as by swallowing the hair it unites with the curd in the stomach and forms balls which are indigestible. The calf-house should be thoroughly cleaned out daily by flushing with water, if possible, and sweeping until all bad smell is removed, and the calf should always be kept on clean dry litter. By the time your winter calves are ready for weaning spring grass is ready for eating, and the calves are big and strong enough to go well through the following winter. The cow also brings another calf at the same time next year. With late spring or summer calves it is very different. They are generally weak in winter, and never come to much—at all events, never acquire early maturity. Then late calves, while worth less than early ones, will generally cost more in rearing, as the early ones have the advantage of being weaned on early grass. In a milk dairy it is incumbent to have some of the cows calving every month of the year; but where the rearing of young stock is the prime object, the calves should not arrive later than February or beginning of March. The newly born calf should get its own dam's milk as long as it retains its medicinal qualities. After the first week the albumen in the milk decreases to about one-half, so it is well that the young calf should receive Nature's medicine. I observe that they always do better when so treated. The calf should have new milk for the first four weeks, taking care that it does not get too much, but gradually increasing the quantity until it reaches ten quarts, feeding three times a day—four quarts at night, four quarts in the morning, and two quarts at midday. I have been told that this is too much, but I believe in liberal feeding, for depend on it, it is what goes in at the mouth that makes the beast. Ten quarts form the maximum quantity to be given at four weeks old.

At the end of that time something else instead of new milk may be given. The best substitute I have ever found for new milk is boiled linseed. One pound of linseed, thoroughly boiled in one quart of water, makes a nice jelly. Withhold from the calf say a quart of milk each meal, and put instead half a pint of the linseed jelly; gradually reduce the milk and increase the jelly for another week, at the end of which time the calf will be about six weeks old. At this age it ought to be castrated. Skim milk may afterwards be given, two quarts of the skim milk and a pint of the jelly three times a day. I have tried porridges made with all kinds of meal, but have never found any of them to compare with the linseed (1). The quantity mentioned need never be increased, but a little dry linseed cake should be given as the calf gets older. It should be allowed hay; at four or five weeks old the calf will be eating both cake and hay. The treatment I have described applies when the calf is in the house and fed from the pail. If it be in the season, a few roots or some grass may be given, but the calf should have very little of these the first six weeks. At about eleven weeks old the milk and linseed jelly may be reduced gradually until the calf is weaned altogether, at the age of from fourteen to sixteen weeks. By this time it will eat enough to maintain its condition. High feeding need never be resorted to, but the greatest care should be taken to keep the animal always progressing. Never lose the calf-fat.

If now put out to grass, the pasture should be clean, and afford a full bite, and the calf should always be brought in at night to lie warm and dry, all the time continuing the linseed cake as before. I am of opinion that calves should never be put out to grass, especially on cold, damp land; a

(1) All the best breeders add pease-meal. A. R. J. F.

far better system is to keep them in an open court, with plenty of shed-room, feeding clover, green fodder or roots, with their daily allowance of cake. Should you put them to grass during the summer, only leave them out during the day, always taking care not to leave them exposed to morning and evening chills, and they should be taken up early for the winter. When brought into their winter quarters they should be fed liberally twice a day with a mixture in equal proportions of bruised oats, bran, and corn meal, with a few roots added, if possible, and hay of the best quality, either cut or uncut. Under such treatment they will not only keep their calf-fat, but will largely develop their frames and muscles. So long as the calves continue to receive food in the fluid or semi-fluid state, the temperature should not vary more than 5 degrees; the best temperature is 90 to 95 degrees—the natural heat of the milk when fresh. Cold food is a fruitful cause of derangement of the digestive organs, leading on to obstinate diarrhoea, which frequently proves so fatal. Pay the utmost attention to fresh air, shelter, and cleanliness, without which all attempts at rearing calves will end in loss and disappointment. Never allow your calves to have access to cold water till they are two months old. It causes scouring more than anything else, although little suspected. Milk and gruel ought to satisfy them without water, if given in the quantities I have described. Overcrowding is equally injurious to health, whether it be in the dens of a higher order of organized beings or amongst those of our domesticated animals. The secret of weaning calves is entirely one of detail—reduce the milk gradually before weaning. Its success or failure depends entirely on the care bestowed on their food, shelter, and cleanliness.

Sufficient for the pail. Let us now pass on to the suckling of calves. Suckling is the natural way of rearing calves and all young animals, and as yet no other method that has been adopted can equal it. What more beautiful sight can there be than a mob of well suckled calves running with their dams? Plenty of milk from the udder, as the calf desires it, is the one way to insure success in rearing; if stinted when a calf, a year's growth is lost. Selling a great deal of butter and rearing good bullocks are incompatible. Many good calves are milked from the pail, and are said to thrive better after they are weaned. This I deny. It must be admitted that the sure way to make first-class calves is to allow them to suckle, taking care that they have always sufficient milk. There are many drawbacks at the expense of the calf when pail-fed; drafts will be indulged in by the housekeeper for milk—butter and cheese for the family—which cannot be made if the calf is suckled by the mother in the field. The plan of some farmers of giving their calves skimmed milk without adding any ingredient to make up for the cream cannot be too much condemned, and to give old milk to a new dropped calf is preposterous, for it is often done. It is thoroughly unnatural, and frequently results in death.

To make a first-class calf it should be allowed to suckle for eight months. By that time it has strength to be weaned, and if properly cared for, and not checked in its growth, it will retain the good calf-flesh it has put on. The damage by the loss of the calf-flesh can not, I repeat, be remedied; if the calf-flesh is lost, the animal will be reduced in value, and seldom, if ever, can be made to yield the same quantity or quality of first-rate meat. Great care therefore must be taken in the weaning of your calves. It is true that as a general rule calves that are allowed to run at large are much wilder than hand-fed ones; hence the supposition that they do not wean so well, but it is a mistake, as they can be weaned as well from the udder as from the pail. It is the general custom to wean suckling calves right from their mothers without learning them to eat meal or cake; they are

deprived of their milk at once, without receiving any substitute for it; they are allowed to stand in a field, bawling, for nearly a week with hardly ever tasting food or water. With such treatment, what can you expect but deterioration? The unfortunate calves are blamed for it instead of the ignorant breeder. Suckling calves intended for weaning should be driven into a court along with their dams every night for about three weeks previous to taking them from their dams. They should then be drafted as gently as possibly into a separate yard, and kept there over night. Troughs should be placed beside them, containing a small quantity of crushed oats, corn meal, and bran, and in the hay racks should be placed some good sweet hay. In a few days they will begin to eat as well as the hand-fed calves; indeed, there should be a few pail-fed calves put along with them, as such will assist in taming the others, as well as setting the example of eating artificial food. In the morning let the calves and dams be turned together, bringing them in at night, as usual, and separating them. After being a week under this treatment, keep them apart from their nurses, only allowing them to suckle once a day for the next fortnight. Now the time arrives when you must try your skill as to which is the best method to make up for the oleaginous matter you are daily depriving your calves of; in no way can you do this better than by allowing them one pound of flax seed meal, mixed with their other food, every day. Continue this system, and at the end of the second week increase the flax meal to two pounds per day, and if you think necessary, increase still another pound, when you deprive them entirely of their milk at the end of three weeks. Any one who will try this system once will continue it. By this means you will not only wean your calves gradually, but you will also reduce the cows' milk by degrees, keeping the udders in good form, and saving a great deal of trouble in milking. The sooner the cows are now dry the better, so as to be in good condition for producing the next calves. Allow the calves abundant fresh water, and under the above treatment they will not lose a pound of flesh, but, on the contrary, will make a daily gain, and by keeping them progressing you will have your steers prime fat at two years old.

*Insect enemies (continued).*

THE GRASSHOPPER OR LOCUST PLAGUE.

The locusts belong to the ORTHOPTERA or STRAIGHT-WINGED INSECTS. Insects of this order have long straight wing covers, under which the wings proper are plaited up fanwise. The Orthoptera are divided into four groups:— I. CURSORES (*Runners*). II. RAPTORES (*Graspers*). III. AMBULATOIRES (*Walkers*). IV. SALTATOIRES (*Jumpers*). The last include the crickets (*Achetada*), grasshoppers (*Gryllida*), and locusts (*Locustada*). It is these insects which produce those incessant sibilations which give us, in our still Autumn evenings, such a wondrous idea of the prevalence of insect life.

SONNET.

On either hand arise the wooded hills,  
And leafy branches mingle over head;  
O'er all, heaven's vast unclouded vault is spread,  
Which the round moon with silver radiance fills.  
The cricket chirrups, and the gryllus shrills—  
Ten-thousand notes are all around us blent;  
The shaken air itself seems sibilant—  
From every bush the constant burden trills.  
It is to us as is an unknown tongue:  
We hear it, and pass onward, gaining nought;  
We know not with what meanings it is fraught—  
What triumphs, loves, and fears in it are sung;  
CREATOR, GOVERNOR, to THEE alone,  
Comes the full import of each several tone! T. W. F.



It is in lands situated near large tracts of uncultivated territory, and in dry seasons, that the encroachments of locusts are to be dreaded, more especially where prairie chickens and other gallinæ are scarce. Such countries, in olden times, were Egypt and Palestine. It was the east wind blowing over the wildernesses of Arabia and Southern Persia that "brought the Locusts." It is the west wind blowing from the Rocky Mountains, which, in our day, brings the locusts to the Saskatchewan and Red River territory. Indeed, it is because the prevailing winds set in the opposite direction that the advance of the locusts is checked, so that the creature is still appropriately known as the *Rocky Mountain Locust*.

The small Red-legged Locust (*Acrydium femur rubrum*), which thrives in the salt-marshes of the Atlantic sea-board, has often extended its ravages to the neighbouring uplands.

The two most striking species we have in Canada, are the Carolina Locust (*Locusta Carolina*), and the Rattling or Yellow winged Locust (*Locusta sulphurea*). The under wings of the former are black with a yellow hind margin. Those of the latter are yellow, bounded with dusky brown. These locusts are they which continually spring up at our feet as we walk on the road side in August and September. The peculiar snapping noise, by which our attention has so often been arrested, is made by *L. Sulphurea*.

In the Province of Quebec there is, I think, but little danger to be dreaded from locusts. Cultivation of the soil, by exposing the eggs to birds, keeps down their numbers, and domestic poultry, especially turkeys, are an invaluable check to their increase.

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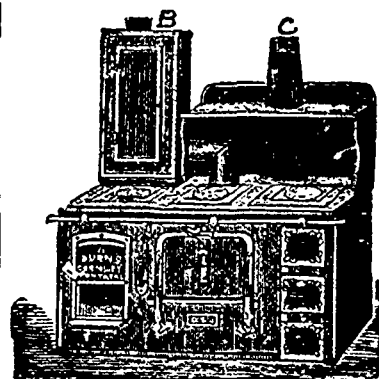
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