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THE ILLUSTRATED

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School-Farms—Industrial Agriculture.

About a twelvemonth ago, I drew the special attention of my readers to the suffering condition in which our agricultural population was plunged. I pointed out, as one means of improvement, the advisability of encouraging the production of butter and cheese of superior quality. I showed that the fattening of cattle for the English market, which, up to the time in question, had been vaunted as a panacea for our ills, was a capital error; for two reasons: 1st. because in order to pursue it the hardy little Canadian cattle had to be displaced by the large foreign breeds—breeds which are by no means suited to the system of farming practised in the *French country*; 2nd. because the food necessary for the production of 100 lbs. of meat, worth at the utmost $5.00 live weight, would easily yield, on an average, 64 lbs. of butter worth at 25c a lb. $16.00
or 175 lbs. of cheese, worth at 12¾c 22.32
or 120 lbs. of half-skim cheese at 6c $ 7.20 } 23.20
and 64 lbs. of butter 16.00 }
without admitting into the computation the pork and veal produced by the skim-milk and whey; which often pay the cost of labour employed in the dairy in excess of that required for meat-growing alone.

I think it is thus proved to demonstration, that when the farmers of the province refuse to engage in the fattening of cattle, where dairy-farming is easily pursued, they are perfectly right.

Nobody has succeeded in proving the above calculations to be wrong. On the contrary, the highest authorities in England now admit, that, given the best milch cows, it is possible to produce a pound of butter, or its equivalent in cheese, at the same cost as a pound of meat: the best and most suitable conditions being in both cases available. In England, the enquiries into the causes of agricultural depression which have lately taken place, prove this at least: where meat has been the main dependance of the farmers, they have suffered more than where milk, butter, and cheese have formed the principal products of their land.

These facts seem too important to be passed over in silence.

Last year, I again expressed my opinion, that the establishment of dairy-schools in the province would have the effect of greatly increasing the value of our products; and I recommended the immediate erection of one of these schools in the district of Kamouraska, still so celebrated for the quantity of butter it sends to market, though the quality, alas, is no longer in repute.

The effects produced by this school, which has only existed for a few months, have surpassed our utmost expectations. In spite of the difficulties which beset the starting of a new enterprise in the country, the goods from this school have brought the highest market price. The butter sold at Quebec for 28c to 30c a pound, and not one fourth of the quantity asked for could be supplied; while good autumn-made butter from the imme-diate neighbourhood of the dairy-school would hardly bring 15c. It was the same with the cheese: it brought the highest price paid in the Montreal market.

The impetus given by the creation of this school, and by the articles in the *Journal d'Agriculture* which preceded and followed its establishment, has by no means subsided: on the contrary it has acquired additional force. The erection of cheese and butter factories, is now the main subject of conversation in the country parts, and I am asked every day to send skilled operatives to take charge of new factories. Unfortunately, competent men are hard to find; I know of hardly any, and the wages demanded are exorbitant. Besides, out of every ten dairy-operators, one may perhaps know his business thoroughly, the other nine have, still, a great deal to learn. It is an indisputable fact that most of our cheese is only of the second or third quality, and, in consequence, sells in Montreal for 10 p. c, or even 15 p. c., less than the cheese from Ingersol, Ont., 300 miles west of Montreal. From a long course of study on the question, I have arrived at this conclusion: there are three causes on which this inferiority of price depends: 1st. the cheesemakers do not perfectly understand their business; 2nd. the buildings, particularly the drying rooms, are inferior in plan and construction; 3rd. the milk is more or less damaged before it arrives at the factory.

The production of cheese in this province amounts to 15,000,000 lbs. (1) worth nearly $2,000,000, and as it is comparatively easy to raise the value of the cheese by about 10 p. c. by giving improved instruction to our present makers, we

(1) There was about 200 cheese-factories at work in the province last year I put at 75,000 lbs the average manufacture of each factory. This year at least 250 factories will be at work.

at once increase the worth of the product by $200,000 a year, in cheese alone, without reckoning the profits gained by the erection of new factories of the first class.

But another side of the question presents itself, which appear to me still more important in its immediate consequences. Up to the present time, the establishment of a butter or cheese-factory has required a considerable sum of money, and a number of farmers willing to contribute the milk of at least 300 cows to its alimentation.

Now, when we consider the peculiar conditions in which the farmers of our province are placed, we shall see that for one place where these conditions can be fulfilled, there are hundreds in which for many a day their realisation must be impossible. Moreover, there is no doubt that equally fine butter, and as delicate cheese, can be made from the milk of ten cows as from the milk of three hundred. It is only a question of *knowledge* on the part of the maker. On the other hand, it will be easily seen that the skilful workman will naturally seek for an establishment on a large scale: there alone is he likely to get high wages, but it is not the less clear, that, as regards the interests of the province, what we should chiefly aim at is, to bring about the making of the finest quality of butter and cheese on a large or a small scale alike, and to make as little as possible of a secondary quality.

In Europe, in general, butter and cheese are made at the farmers' houses from the milk of two or more cows, according to the extent of the farms. Nevertheless, Europe, particularly France, produces the finest butter, and cheese of a quality far more sought after than the best samples from America.

The experience I gained in a year's attendance at St. Denis, and the enquiries I have followed up for nearly ten years; to say nothing of ten or twelve journeys to the States for the purpose of studying the dairy-practice of that country, enable me to affirm with certainty that it is possible to learn to make the best possible butter in a very few days. The learner need not be a scholar: intelligence, good will, and activity, are the only requisites.

The mass, too, of our cheese makers can be taught in a short time all that is necessary to raise the value of their cheese at least 10 p. c. At the same time and in ten or twelve days, if they will give their attention to the subject, they can learn all that concerns the practical part of making the best butter, and, in addition, the way to make skim-cheese.

To arrive at such a consummation, at once a pressing and desirable consummation, all that is necessary is to transform the dairy-school, which was founded for a temporary purpose last year, into a school of dairy work for the general public, a school to which any one may go to learn, in a few days, all that is necessary for him to know, whether he desire to make better cheese than is made anywhere else at present, to make skim-cheese, or to make the finest quality of butter.

What I have said applies evidently only to cheese-makers already in practice, and to those who wish to learn how to make butter; for every novice in the art of cheese-making must of course pass through an apprenticeship of several months before he can benefit by the instruction of the school-manager.

As to the production of good butter in the province, there is but a moderate quantity of *creamery* made. The first creamery was only established 3 or 4 years ago (1). Now, common butter has no sale in foreign markets, on account of the enormous quantity of artificial butter offered, which the best judges agree in estimating as much superior to our ordinary butter: it is also cheaper. What can be more urgent than the improvement of an article, which, in our province amounts to 25 millions of pounds? Our butters, in spite of an occasional high price for extra quality, only average 15c. a pound, while creamery butters are selling for 25c. to 35c., wholesale. Allowing 10c. as the difference between common and creamery butters, we get at a dead annual loss of $2,500,000, to our farmers on butter alone.

Well! I am not afraid to affirm that we can entirely change the state of things in a very short time, and create a new revenue for our agriculture, one of still greater value, by the progress in farming matters which an abundant production of milk and its sequel always brings in its train. And it is by a continuance of our treatment of agricultural subjects, as shown last year, that this will be done: namely, by the foundation of dairy-schools. Nor will it be only the improvement of our butter and cheese that will be caused by these schools: lessons in general farming of the highest importance may be instilled there. Thus, by placing the proposed dairy-school on the farm of a certain person, whom, if I chose, I could name; one who is a friend of his country, where all the great problems of cultivation are studied every day, especially the comparison and improvement of the best breeds of cattle in the province as regards the production of milk; the preparation of cattle-food, of a richer description than usual but at the same time economical, which will allow, on the same extent of land and with the same herd the yield of milk, and therefore of butter and cheese, to be doubled, and even tripled; side by side with these experiments made on a small scale on a farm of 80 acres the pupil will see the working of farm implements of the most useful description; he will view for himself the results of a system of cultivation less costly but more productive than that generally followed in our province. He will see fields cleared of stones; roads improved; drainage carried out by utilising these very stones as conduits. A fair sized orchard will be before him; some plantations of forest trees carried out not unsuccessfully, a most productive kitchen garden, in a most infertile soil—an old shore of sand and gravel; and, lastly, there is a small vineyard of 60 vines of 12 different kinds, producing good fruit, from which wine has already been made.

The farm I have just described belongs to a Canadian farmer, who began work 26 years ago without a farthing of ready money. Its owner, now growing old, could find no greater pleasure than contributing, before his death, to the extension among his country of the sound agricultural lessons he himself has imbibed.

The press has recently often spoken in favour of establishing farm-schools, and thus encouraging the best farmers of the province. Now, it seems to me that no one of them is better worth encouragement than the one I have alluded to.

I have not the slightest doubt that any intelligent farmer who will pass a week on this farm would learn, in addition to the way to make the best butter, more about the proper methods of cultivation than he could learn in any other way even if he were to sacrifice a whole year to his studies.

It is only right to say that the farmer in question speaks both French and English equally well; and that the instruction to be given will apply equally to both French and English pupils.

A few figures to end with:

From the inferiority of our cheese the province now loses every year, in hard cash, at least...	$ 200,000
Its loss by inferior quality of butter is about...	2,500,000
It could easily double its production of butter and cheese without diminishing the grain-harvest. On the contrary, its yield would be increased by the utilising of the manure made.	

(1) About 30 creameries were in operation last year. This year there will probably be 50.

The actual production of butter and cheese in the province is worth every year at least	5,000,000
The other improvements in farming which cannot fail to follow in the wake of good instruction should be worth, anyhow, annually.....	5,000,000
	12,700,000

Thus an additional net annual revenue, amounting to twelve million dollars can be assuredly offered to our people by means of agriculture and its accompanying industries, if they will profit by the instruction which we are in a position to set before them.

And more than this; no new expenditure will be required. The sums voted in aid of agriculture in the present budget will afford all that is necessary for the proposed scheme, by a simple re-adjustment of their distribution.

I submit this project in all confidence. It seems to me, that, by its means, a new and important elasticity would be imparted to the progress of agriculture in this province of Quebec.

(Translated from the French.) ED. A. BARNARD.

First steps in Farming—Young Man's Department.

We have seen that phosphoric acid, one of the most important manures, is very seldom, if ever found alone. And as we dive deeper into the study of plant-foods, we shall meet with many instances of the same kind. And it is fortunate for use that this is the case; for if it were otherwise, if phosphoric acid and nitrogen were not chemically combined with other substances, it is most probable that the one would be quickly washed clean out of the soil, and the other would never be found in a fit state to enter into the substance of plants.

Now we know by this time, that very great errors have been commonly accepted and acted upon by the agricultural population of the old countries, errors which, even now, are not nearly consigned to limbo. And, in this country, more especially, many a hard battle remains to be fought before the end of manurial superstition is arrived at. It seems like a fable to hear the statement that a few hundred pounds of a mixture of two or three matters will produce as great a crop of grain or of turnips as many tons of our old and tried friend, farmyard dung, will do.

The mind, particularly the mind of the uneducated, revolts from such a statement. And the reason is plain: the bulk of the one has, naturally enough, a fascination for the eye, while the idea of three quarters of an ounce of a white crystal having any effect on the produce of a square yard of land appears, at first, positively ludicrous.

I believe I was one of the first to try the effects of *Peruvian guano*. I remember well the easy incredulity with which our Kentish labourers and farmers regarded that substance, and the determination with which they refused to believe that the turnips, many from 27 inches to 33 inches in circumference, which were the result of its application, owed their enormous size to such a trivial cause. Their conversion was not difficult. I marked out half an acre of fall-wheat, and, in the spring, telling them what I was going to do, and what the effect would be, I dressed it with 3 cwt. of guano, analysing, as it did in those days, 17 o/o of ammonia. What followed was a lesson to the neighbourhood, which I dare say it has not yet forgotten: the guano-dressed half acre produced a mass of straw, fell to the ground a week or ten days before beginning to ripen, and was hardly worth the pains of threshing; while the remainder of the field yielded the usual crop of 36 bushels of wheat, weighing 63 lbs a bushel. I am sorry to say that there is very little chance of 3 cwt. of guano behaving in such a way now! Instead of 17 o/o of ammonia, 9 o/o, little more than half, is the present strength of that manure; and you will easily see that, in the one case, 114 lbs. of ammonia were given to the acre, in the other, only 59 lbs; the cwt. in question being the old one of 112 lbs.

This very valuable manure is found at its best on the coast of Peru. It is the dung of sea-birds, fish-eaters, and has accumulated for many years in deep holes in a climate where hardly any rain falls. It had been used in Peru for many years before (1839) it was imported into England. Some of the deposits were 200 feet deep, and several millions of tons have been extracted from them. There are other places where guano is found, but as they are all, more or less, exposed to rainfall, their ammoniacal contents are insignificant, and their chief value consists in the amount of phosphate of lime they contain.

Now consider for one moment wherein the value of this guano consists. First, it must have some marvellous good qualities in it, or else the inland farmers of Peru would not bring their *nitrate of soda* to the coast to exchange for guano. The nitrate contains, generally, 16 o/o of nitrogen, equal to 20 o/o of ammonia, and is of course a very valuable manure, much used in England to-day, as it is cheaper in proportion than sulphate of ammonia.

It is clear, then, that there must be something in the guano which is not found in the nitrate: what is it? Simply, phosphoric acid! In good samples of Peruvian guano there will be found about 35 o/o to 40 o/o of phosphates, and it is this that makes it worth the Peruvian's while to take the pains he does to obtain it.

A rough analysis of a guano may be taken as follows:

10 o/o ammonia
10 o/o soluble phosphates
27 o/o insoluble do

There is, generally, a certain percentage of potash, but it is not worth reckoning. In fact, potash, as a manure, is in a rather peculiar position just at present, and if used at all, should be used very cautiously. This warning is not intended to hinder the free use of wood ashes, which are not caustic or *burning* in their effects.

I need not enter upon the question of nitrate of soda, as it is not on our market yet, and I do not fancy it will be for some time, if ever. It contains nitrogen in the form of nitric acid combined with soda. It is formed as a crust on the surface of the ground in Chili and Peru.

Sulphate of ammonia, however, is here at hand, and cheap enough to be used by any one however moderate his means are. It is the product of the Gas manufacture, and was formerly thrown away. It is obtained from what used to be called the *waste liquor* by adding sulphuric acid in sufficient quantities to combine with the ammonia, which is always formed by the distillation of coal. It contains, at least the Montreal sulphate does, nearly 25 o/o of ammonia, and, consequently may be used without fear in any quantity up to 300 lbs an acre.

We must make one remark. Ammonia is one thing, sulphate of ammonia is another. It has too often been the practice of roguish manure-merchants to state the ammonia in their goods as sulphate. It looks large in the figures, but can deceive no one who will take the trouble to divide the amount of sulphate of ammonia by 4. Thus 200 pounds of sulphate of ammonia contain how much ammonia? $\frac{200}{4} = 50$; which, with 300 lbs of bone meal, is a good dressing for an acre of oats, barley, or wheat, and would cost about $12.60. Bone-meal, I see, fetches $32, a ton; at least $6 more than it ought to fetch.

I hear from Mr. Patten, Sherbrooke cloth mills, that they have no waste materials to dispose of. Woollen rags are a

most powerful manure, and used to be very much used as a dressing for hops. They contain about 11 o/o of nitrogen, which by decomposition will yield rather more than 13 o/o of ammonia: there is also 15 o/o of phosphoric acid in the ash which would give about 1.5 o/o in the recent materials, equal to 3.20 o/o of phosphate of lime. As the nitrogen in rags gives out ammonia, so to speak, very slowly, very little benefit will be derived from them the first, or even in the second year; but for hops or orchards, in fact for any permanent plant, they are invaluable.

Fish refuse, blood, the waste of slaughter houses and tanyards, are all valuable manures. I hope it will not be long before every town will have its disintegrator at work, and every fishing establishment in the Gulf will produce its hundreds of tons of fish-guano. Our chief reliance however, for the present, must be on bones and sulphate of ammonia, with a few bushels of wood-ashes if thought desirable.

And now let us see how we can arrive at a fair judgment as to the value of any of these artificial manures. In the first place we must insist upon being furnished with an analysis by our merchant containing a full statement of the different constituents of the article we are purchasing. Each of these constituents has a definite value, except of course the water, sand, and vegetable matter, the presence of which in quantity is frequently very delusive. (1).

Take, now, the analysis of guano given above, and let us put a value on the three ingredients.

Ammonia	10 o/o at 16*s*.per unit	= 160
Soluble phosphate of lime	10 o/o " 3*s*.6*d*." "	= 35
Insoluble " " "	27 o/o " 2*s*. " "	= 54
		249 = $62

Bones, again, may be valued thus:

Insoluble phosphate of lime	50 o/o at 2*l*	= 100
Ammonia	4 o/o at 16*l*	= 64
		164 = $41

The above computations are made according to English prices and are calculated *per unit;* for example: each unit of ammonia is worth 16 shillings, each unit of insoluble phosphate of lime 2*s*; and each unit of soluble phosphate 3*s*. 6*d*. In this country, with bones and sulphate of ammonia purchasable at 20 o/o less, the price of manures should be lower per unit, and of course the difference of our cwts must be allowed for. Thus a sample of manure here compared with England, should be worth less in the ratio of 28 . 25, and the price would be, for the guano we speak of above: 28 . 25 .. $62 . $55.35. The ammonia is worth 16 cents a pound at the gas works, so, here, the 10 o/o in the guano would be worth $32 per ton; the 93 lbs of soluble phosphoric acid at 11 cents would give $10.23; and 123 lbs of insoluble at 6 cents would come to $7.38; making in all $49.61. (2)

In Canada, where *plaster*, or sulphate of lime is so cheap, I strongly advise its application as a regular part of the manuring system. It seems to suit all pod-bearing plants, pease, beans, clover, tares or vetches, particularly, but in soils where lime is wanting its use would benefit all crops. Sow nitrate of soda, or sulphate of ammonia, over grass land, and the grasses will overpower the clover; sow superphosphate, and the clovers will reverse the fact: the reason is that with each 100 lbs of superphosphate you have given the land 37 lbs of gypsum or land-plaster. See journal for May, p. 1; *products of decomposition.*

ARTHUR R. JENNER FUST.

(1) I mean this formula. 20 o/o of organic matter containing ammonia; the ammonia is what we want, the organic matter, *per se*, is not worth its carriage.

(2) By the bye, in the journal for May I am made to say that brown sulphuric acid could be made here for 1¼ cents a pound. it should be 1¼.

Liquid-manure tanks.

An enquirer wishes to know my opinion about the management of the liquid manure on farms where little straw is grown. He is not singular in his idea that the question is a puzzling one. He is tired of carting *black earth* to the stable and back again to the fields, to say nothing of the digging it and setting it up to dry, and I do not wonder at it. On a small farm, where a puncheon would hold a week's supply of urine, it might be mixed with its bulk of water and carted out at once to the grass land, this, however, could not be done in the winter, and it is in that season that the principal amount of urine is available. I suppose a tank must be built, and the bulk kept for distribution in the spring, but the whole subject is full of difficulties. This I must say, that I have known many tanks built for the purpose, but after a year's trial they have been disused. The favour of correspondence on the subject is solicited. A. R. J. F.

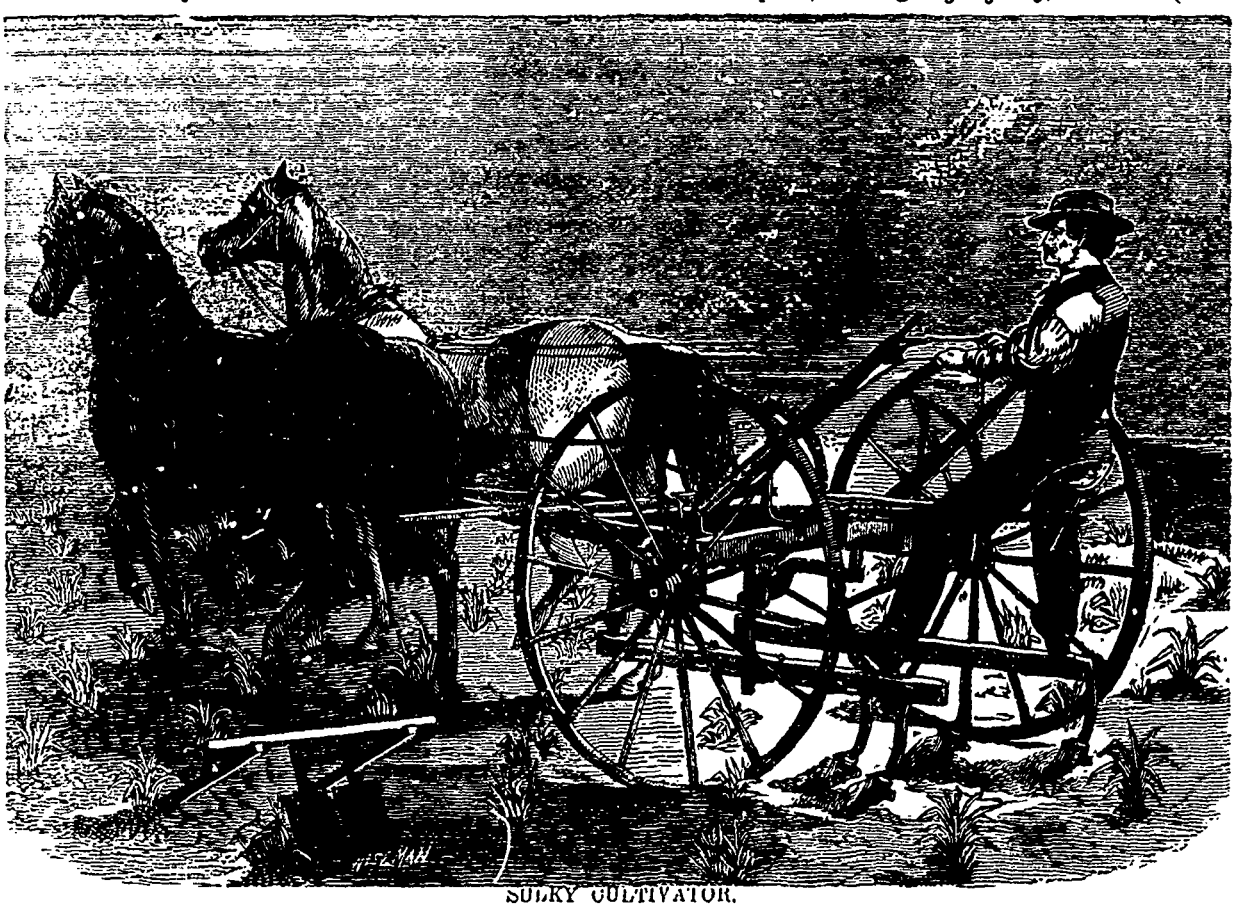
Farmers, land agents, and landlords need to learn that plants take only nitrogen and mineral matters from the land. It is a tremendous and a costly mistake to imagine that the carbon, the hydrogen, and the oxygen, which constitute the bulk of all crops, come from the soil. The *carbon* comes wholly, or practically so, from the carbon which exists in the air in small but sufficient quantity, and which is being as continually extracted from the air by waving corn fields and towering forests as it is being as constantly returned from every decaying organic substance, from every fire, every furnace, and every lung. The *hydrogen* and *oxygen* the plants find in water; and the carbon of the rotting straw, though it adds humus to the soil, *furnishes it with no plant food.* In short, the burying of straw is a most unprofitable business.

Chambers' Journal.

Sir John Bennet Lawes, F. R. S., F. C. S., L. L. D., is now the style and title of our great English farmer. Mr. Lawes, as he was then, was elected a Fellow of the Royal Society in 1854, and in 1867 the Royal medal was awarded to him by the Council of the Society. Sir John has also received a gold medal from the Imperial Agricultural Society of Russia, and last year the Emperor of Germany, by Imperial decree, awarded the gold medal of merit for agriculture to him in recognition of his services for the development of scientific and practical agriculture.

The scientific discovery around which all Mr. Lawes' subsequent work centred was the disproval of Baron Liebig's celebrated *mineral-ash* theory. At the time the Rothamsted experiments commenced, it was generally supposed that certain saline bodies, so-called mineral constituents, were essential to the growth and development of the plant, and that such substances must be furnished to it by the soil. It was also believed that a certain quantity of nitrogen was wanted, but as wild plants throve without any artificial supply of that substance, it was supposed that an amount of that element sufficient to feed our cultivated plants, existed in the atmosphere. The Liebig theory was this: "the fertility of a soil can be maintained for an indefinite period, if the different mineral constituents carried off by the crop be annually returned to the soil in due quantity as manure." Lawes, on the other hand, held that the great desideratum was nitrogen, and that where scanty in quantity, it must be added to the land as a manure, for "the amount of nitrogen supplied to our crops from the atmosphere, whether as combined nitrogen brought down by the rain or that absorbed by the soil, or the plant, constitutes

but a very small proportion of the total amount they assimilate: the soil itself, or the manure, is practically the main source of their supply." He showed by numberless experiments that, taking the results of twenty years, the average production of wheat at his farm was 16½ bushels of wheat per acre without manure, with 14 tons of farm yard dung exactly double, and with artificial manures, *mineral* and *nitrogenous* combined, 35¾ bushels. The whole structure of plants consists of cells; and Boussingault, the most accurate investigator of modern times, has arrived at the same conclusion as Lawes and Sach, namely, that plants *cannot assimilate free nitrogen;* and I think that, when three such great authorities agree so entirely, it is time for us to stop talking of "plants obtaining all the ammonia they want from the air."



SULKY CULTIVATOR.

Sach, the great German botanist says: "If a cell contains a *nitrogenous* body it can develope new chemical combinations and form new cells: if it contain none it is not capable of further development." A. R. J. F.

A New Antiseptic Compound.

Professor Barff read a paper at the meeting of the Society of Arts, the other night, on the subject of "A New Antiseptic Compound for the Preservation of Food." There was a very large attendance. Professor Barff, after referring to labours extending over some years, stated that he turned his attention to the employment of boracic acid, which was already known to have antiseptic qualities, difficult, however, of application, owing to its insolubility in water. By heating boracic acid with glycerine a substitution product was obtained, in which glycerine united with boracic acid, forming a glyceride analogous in composition to natural fats. This substance forms a glacial mass, soluble in water, and having powerful antiseptic qualities. The method of preparation was as follows:—Glycerine was heated to a high temperature and boracic acid was added as long as it dissolved, the proportions being 92 parts of glycerine to 62 of boracic acid. When this was allowed to get cold, a white crystalline compound formed which disappeared on further heating. Water was evolved during the whole of the operation, and at last, when steam ceased to be given off, the mass set into a hard, ice-like substance, and it was found to have lost in weight exactly 54 parts, which corresponds to the weight of three molecules of water. Thus it appeared that all the hydroxyles in the glycerine had united with the three atoms of hydrogen in the hydrated boracic acid, and that the BO_3, that is anhydrous boric acid, had taken their place, forming $C_3 H_5 Bo_3$, which is (as has already been stated) analogous in its composition to a natural fat, Bo_3 taking the place of the fatty acid. The innocuousness of the compound had been proved by the fact that milk treated with it had been used at a college near London, containing three hundred persons, during the whole of the summer months last year, without anyone suspecting the presence of anything unusual. The milk kept perfectly sweet during the whole of that period. A lady had taken cream prepared with it every morning for a year and a half. The boro-glyceride, which is the new preservative, is mixed with about fifty times its own weight of water. The original cost is small, and thus the diluted mixture sold in commerce can be produced at less than 1s. per gallon. A gallon thus sold will preserve as much meat as can be surrounded by it in any containing vessel. It can be used by untrained persons, and the same liquid may be employed over and over again. The practical success of the system was manifested by a number of specimens treated at home and others sent from Jamaica, all of which were in

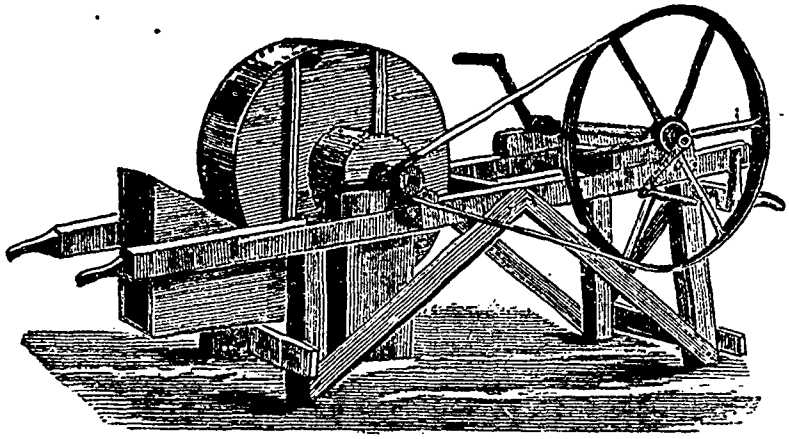
a perfectly fresh condition, and retained their natural distinctive flavours. Among the specimens received within the last week from Jamaica were fresh turtle, oysters, and fresh pigeons, all of which were cooked and tasted by the audience. Professor Barff suggested various methods by which different kinds of food could be cheaply and effectively preserved in this country for longer or shorter periods. As instances, he exhibited eggs, oysters, lobsters, fish of various kinds, which had been preserved for nearly three months. These were tasted and pronounced to be perfect in freshness and in flavour He also explained how this preservative compound could be used for the temporary or permanent preservation of food in public institutions and private houses, how meats in the dry state could be imported at small cost from South America and Australia, and would serve for the cheap production of soups and potted meats. Specimens of mutton sent from the Falkland Islands in August last were exhibited, both raw and cooked. Professor Barff also read extracts of letters from persons in Jamaica, who had received from him cream and other articles in a fresh condition, and a letter from Zanzibar, in which the opinion of Dr. Steere, the Bishop of the African Missions, was given as to the perfect condition in which he received some Devonshire cream. Samples of meat were also shown which had been preserved for three months in open vessels. They were first exhibited in the raw state, in which they appeared satisfactory, and their taste when cooked was also tested by actual experience. After the lecture and before the discussion, the housekeeper of the Society of Arts took them from the lecture room, and proceeded to cook them, and the public on leaving the hall were enabled to taste excellent steaks, lobsters, sausages, &c., three months old, but tasting as if fresh, and raw oysters which had been purchased in a shop in London on December 5. The appearance and aroma of the articles were in all respects appetising. The Chairman (Dr. Russell) in opening the discussion which followed, stated that he had himself made experiments on cream and meat with complete success, utterly independent of the lecturer, and without his knowledge, and that in every case they were perfectly successful. He considered the process to be extremely simple and economical, and of considerable scientific interest. Professor Graham asked whether the food preserved by the process retained its true flavour and aroma, to which an affirmative reply was given, provided that it was kept in closed, not hermetically sealed vessels. Dr. Thudichum asked questions concerning the effect of the preservative upon the system, and was referred to the experiences detailed in the lecture. Admiral Selwyn hailed the discovery as of great importance to the navy. Dr. Allchin, of Westminster Hospital, suggested its use for preserving anatomical and pathological specimens without altering their colour. *London Times.*

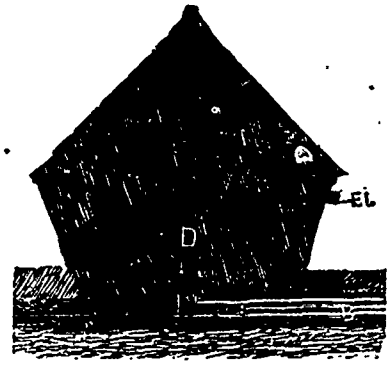
AGRICULTURAL MACHINERY.

SELF-MADE HAY.

The annexed engravings represent a new stack cooler and artificial haymaking fan, by Messrs. T. S. Marriage & Co., Reigate. It will be seen from the engravings that the system adopted is similar in principle to those which have been already noticed in the columns of the *Agricultural Gazette.* Any difference lies in the improvements of the fan and in the building of the stack for its application. In all cases brushwood and every porous material upon which haystacks are built are carefully avoided, a solid concrete or other impervious foundations being provided.

This is desirable in all cases. Any number of openings, D, in the heart of the stack may be made by drawing up a stuffed sack. In short stacks one may suffice, but in long ones two or more may be required. To each opening, D, a tube, B B, extends from the outside, and to the mouth of this tube the exhaust tube of the fan is applied. The fan is of the cylinder construction, and completely closed in, so that the full force of the exhaust is brought to bear upon D, and as the heated air and moisture from D are removed, the cool, dry air from the outside rushes into the partially-created vacuum, thereby cooling and drying the stack. The process is equally applicable to corn stacks as to hay stacks.





The fan is placed upon a wooden frame, and is driven by a strap from the flywheel of the crank-shaft, actuated by two winch-handles. It will be seen that the eye of the fan is closed in by small cylinders, and a feed-pipe from the fan is connected to the mouth of the pipe B, by turning the fan in the direction shown by the arrow. And when the stack is cooled down to the proper temperature, which can be ascertained by the thermometer at E, in the side of the stack, the fan can be removed by the man to another opening or another stack when the one operated upon is finished.

As will be seen from the testimonial of Mr. Norris below, the fan is in use and giving practical satisfaction.

A HAY FAN.—Since I wrote to you calling attention to the Neilson system of drying hay, I have been endeavouring to get a fan which can be worked by hand-power, and am glad to say I have at last succeeded. Messrs. T. S. Marriage & Co., of Reigate, have send me one costing £12 10s., which can be worked easily by two men; and on trying it against the old fan worked by horse-gear, I find it gives decidedly more power. I have also seen drawings of a fan made by Mr. C. D. Phillips, of Newport, Monmouth, costing £13 10s, which can also be worked by two men. I have not yet tried this one, but shall have an opportunity of doing so shortly, as I expect to receive one early next week; after which, if you will give me a small space, I will write to let you know

to which fan I give the preference. The great point is now gained by having a fan which can be used without horse-gear and intermediate motion, and which, from its moderate cost, is within the reach of every farmer. Both fans can be easily moved, which is a great advantage, as fewer pipes will be required, and the same fan can be used at more than one homestead.—*James Norris, Castle Hill, Blechingley, Surrey.*

OUR FUTURE FRUITS.

Whence shall we derive our future fruits? Years ago, when the people of the North-Western provinces of France commenced the colonisation of their new possession, Canada, we may well suppose that the Breton and the Norman did not embark on their adventurous voyage without taking with them the fruits which they hoped to propagate with advantage in their future homes. In more recent days, the Englishman brought with him his Ribston-pippin, his Golden-pippin, and the Scot, his Hawthornden. Nurtured under the soft influence of the Gulf-stream, whose balmy softness tempers the wild gales of the rude Atlantic, these fruits of a milder clime have failed to prove hardy enough to withstand for long the rigours of our own winters, and are unsuited, in many cases, to even the milder parts of the North American continent. Some, it is true, are not unproductive, in favourable localities, as far north as lat. 45° to 45½°; but, as a general rule, the fruits of Western Europe have proved of comparatively little value in the fickle climates of the North-Western States; they are a class which spring from no hardy ancestry, but derive their origin from the *pyrus acerba*, or *crab*, of Southern Europe.

Induced by these considerations, Professor Budd, of the State Agricultural college, at Ames, Iowa, after mature thought, imported a large number of varieties from the interior of Russia; a country, where the summers are hot and dry, and the winters as cold as in the city of Quebec. Mr. Budd has already received two large lots, each lot consisting of nearly 200 varieties of Russian apples.

Previous to this, in 1870, the Agricultural Department at Washington received, and propagated in their grounds, 252 varieties of apples from St. Petersburg. This collection, including a number of trees of French and German origin, proved to have been far too hastily selected In the climate of Washington, all the so-called *late keepers* ripened about August 20th; and until they were fruited in the North, were supposed to be summer fruit. Thus, we were led to expect that the importation of prof. Budd would show like signs of hasty selection. Far from it! It was managed with the greatest care, and reflects much credit on Dr. Regel of St. Petersburg, and Dr. Arnold of Moscow. These collections include the 42 sorts of late keeping apples, selected by the Russian Government commission for trial at the Agricultural college of Petrovsk, New Moscow, of which establishment Dr. Arnold is President. The collections from Kalouga, Simbrisk, and Vladimir, are of great interest. On the steppes near Moscow, where the winter temperature is 2°F. lower than at Quebec, and 5°F. lower than at Montreal, flourish many varieties of *pears:* most of which are the progeny of the snow and strawberry pears of Northern China. In fact the whole repertory of hardy fruits at Ames is as choice and full as Russian pomologists could make it. Here, you may see an orchard of 1,600 fruit trees, all top-grafted with 400 varieties of Russian apples and pears; hardy fruits too from other Northern regions, including the *Siberian apricot*, a fair fruit, hardy, and well worth the trouble of growing; the *Hartz Mountain apricot*, of better quality than the last, and grown, as its name indicates, on the Hartz mountains, 60 miles S. E. of Hanover. The Hartz apricot proved quite hardy at Ames last winter. *Hill's Chili peach*, supposed to be the hardiest of the peaches, suffered greatly last winter at Ames, while 9 varieties of that fruit from Pekin escaped absolutely uninjured. The collection is, doubtless the finest ever seen beyond the confines of Russia, and includes peaches from such boreal regions as 360 miles to the North of Pekin.

Of cherries, we place great confidence in those from the East of Europe. Dr. Lucas of Wurtemburg, has 6 sorts which he strongly recommends for the cold districts of this country: even in Russia, as far north as Moscow, sweet and sour cherries, of all colours, white, red, and blackish red, seem to do well.

The *Russian Mulberry* is said, by the Mennonites, to do well as far North as Simbrisk, on the Volga, lat. 55° N. It is largely grown by these colonists in Minnesota, as far North as lat. 44°; and is used for axe handles, for hedge plants, as a fruit tree, and as food for silk-worms.

As to *plums*, more is to be expected from improvements in the Chickasaw varieties of the Western States than from any importations from Eastern Europe.

It would thus seem that the cultivation, in this country, of the apple, pear, cherry, and other fruits, is capable of great extension, even if we bear in mind that, for all localities North of lat. 45½, we should confine ourselves, mainly, to the fruits of the Russian Steppes. A. R. J. F.

Yield of Bullocks in Meat &c.

A bullock in a fair state of ripeness-not over fat, but fit for the butcher will give about 58% of meat to live weight. In England, the theory is, very seldom carried out in practice I am sorry to say, that the butcher should be content with the fifth quarter for his profit. This fifth quarter consists of the skin, head, fat, tongue, and other, so to speak, refuse parts. Now, I happen to have by me, a calculation made by a butcher at Nottingham, at a time when there was a general outcry in England against the prices charged by butchers. He gives a list, and the weights, of the different parts of a heifer, weighing 40 stones, of 14 lbs to the stone = 560 lbs, and from this list I think it will not be difficult to calculate how much a butcher, in this town of Montreal, ought to charge per pound for his beef, without overcharging his customers, or depriving himself of the fair profit he ought to make on his capital: which, considering all things; the perishable article he deals in; its uncertainty in point of quality; and the trouble in procuring it, especially in such times as the present, ought not to be less than 20 p. c. I would not mind if he would be satisfied with 25 p. c. But when it comes to 30 p. c., 40 p. c. and even 50 p. c., I own that I can bear it no longer, and I and my family must be content to eat fish, vegetables and farinaceous food (which I hate) or—starve. I know well, that many unpleasant epithets will be heaped upon my head for what I am going to say; the retailer, as a rule, is not a mild man when his profits are aimed at, when his dealings are impugned. Well, my head is thick enough; I can bear it; but I cannot bear the farmer being defrauded of his fair share of the price which the consumer pays for his meat.

Our bullock, which we take as a model, weighs 40 stones or 560 lbs. Therefore, on foot, properly fasted, it weighed 950 lbs; and at 7c a pound, the *highest price paid for first rate oxen*, it would cost the butcher, in round numbers $60. (v. Montreal *Star* for Saturday, June 10th.)

Please, recollect, that I charge the highest possible price for the beast, though the heifer we are talking about would only yield a very moderate proportion of joints compared with a well bred large bullock of 70 to 80 stones;—980 lbs to 1,120 lbs.

According to the manager's statement, the charge at the abattoir for slaughtering is 50 cents per bullock. We will allow 50 cents more for carting the carcase home—a dollar in all. Now, look at the weight and price of the dead animal:

Rumps, rounds, steaks, &c.	189 lbs	at 20c	$37.80
Sirloins and bests ribs	98	" "	19.60
Brisket and fore ribs	112	" 14	15.68
Fore-end, stickings, shoulders, &c.	126	" 8	10.08
Weight of four quarters	525		83.16
Bones taken out (they don't take out bones here, I think)	21		
Loss by drying &c.	14		
	560		
Hide 60 lbs at 9 cents			5.40
Tallow 60 lbs at 6 cents			3.60
			92.16

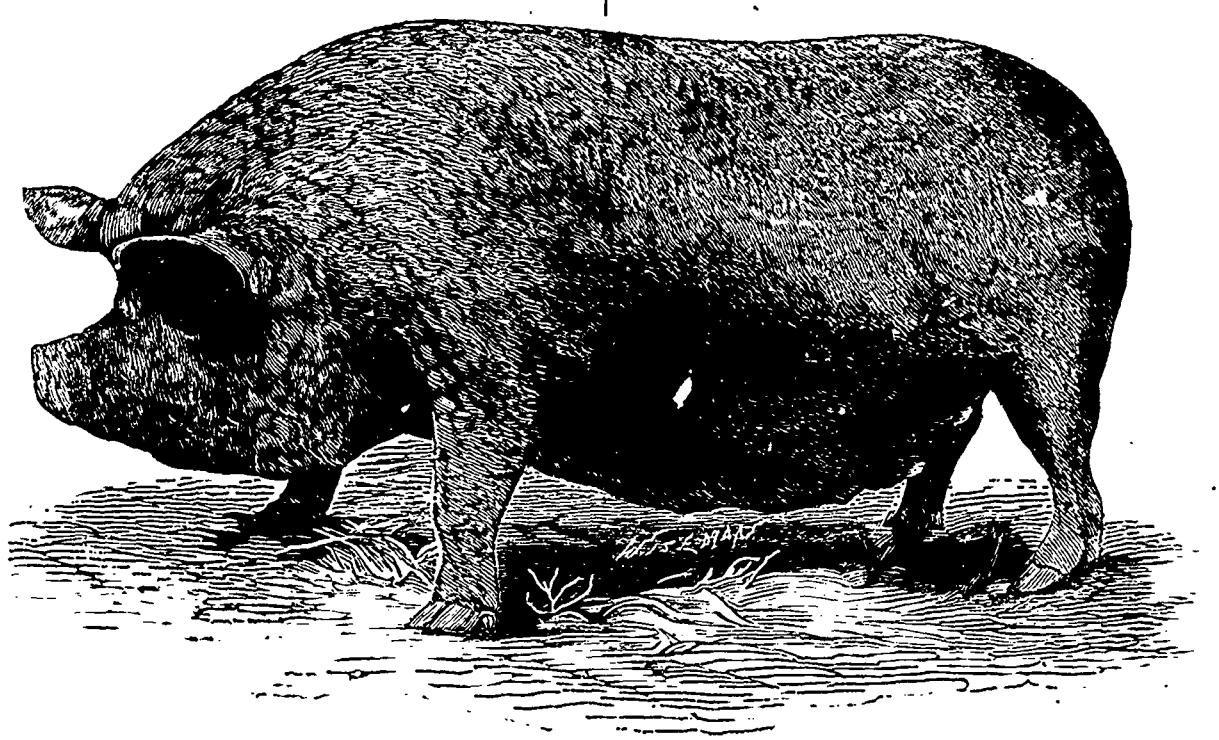
So here we have $92.16 as the retail price of a beast that cost the butcher $61! That is, if the butcher kills three beasts a week, he will clear $90 profit by their sale; leaving the profits of the calves, pigs, sheep and lambs to pay for his establishment charges. I wish I was a butcher! And remember, please, that I have not said a word about the tongue (75 cents), the head (30 cents), the skirt or the liver! As for the heart, which, stuffed and roasted as it ought to be, is one of my favourite *plats*, I conclude the butcher keeps that for his own dinner, as being too tempting a dish for the profane vulgar. But I wish he would not be so selfish, for I and my family can dine well on it, stuffed, with a little red currant jelly, for three days. Two sheep's heads, with onions, parsley, and rice or pearl barley, will give four people a dinner for two days. I vow, if prices last like this, I will set up a perambulatory kitchen, and, going from house to house, show how cheaply good food can be set on even a poor man's table. It is not the horrid old frying pan they should use, but the stew-pan. If they only knew what can be done with a bit of meat, a couple of bones, a few vegetables, with a crust or two of bread, and a little pepper and salt! I can buy macaroni of good quality at the manufacturers, Catelli Brothers, for 8c a pound, and with a teaspoonful of Johnson's preserved beef, a scrape of cheese, and a tiny piece of butter, I defy the hungriest man to eat more than half a pound of it at a meal. But our working men, unfortunately, do not know how to live, and their wives do not know how to cook.

Bread too, that is at a pleasant price!

Cost of one bll. of flour (strong baker's) $6.75. (v. "Star" June 10th.)

264 lbs. white bread at 20 cents per 4 lb. loaf = $13.20.

A small quantity of States' flour is used to "make up" with, but so is a small quantity of cheaper flour to mix with: which makes things about square. Cent per cent!!! Bakers ought to thrive; in fact, I think, upon due consideration, I would rather be a baker than a butcher. Yes! I will bring my son up to that trade.



Essex Sow "Black Beauty."

As for the tavern-keeper I hardly dare talk about his profits. One bushel of barley and 1¼ pounds of hops costing $1.40, make 15 gallons of beer: one gallon of beer gives 20 glasses, which, at 5 cents a glass, equals $1.00—ergo, 15 gallons give to the retailer $15; which, as the raw material costs $1.40, must leave a rare profit somewhere. But in this trade there is a terrible lot of bad debts.

ARTHUR R. JENNER FUST.

Dear Sir.—The correspondence in your last issue brings to my mind the necessity of instructing our farmers how to manage to raise their crops to better advantage to themselves, and how to be able to supply the market with productions that can command a full price.

A number of farmers of the Dominion have been for years raising crops of tobacco, but the article brought to market proves that they know so little about the culture of that wides-

pread plant, that it would be an act of charity and a benefit to the country, if you would, during the present season, give them the information they need.

The Dominion government is anxious to protect tobacco growers to a very large extent, but until they can grow what the manufacturers require, all the protection will do no good.

To commence with, the farmer should know that tobacco raised for being used for cigars commands a higher price than that used for cut or plug tobacco; and in order to cultivate the most desirable article, the proper seed must be obtained, and all the rules of raising the plants, transplanting in cold beds, and re-transplanting in a well prepared field at the proper time, must be strictly adhered to. The plants must then be put at proper distances from each other, and, after this is done, it will be entirely in the hands of the grower, whether he wants a coarse or a thin leaf, and whether he wants large or small tobacco.

Having myself extensive knowledge of the cultivation of tobacco in all climates, and having made very successful experiments as to procuring a good article, even in this very city, I would willingly communicate what I know to those interested, and when the time arrives for the fermentation of the tobacco, will be willing to teach them either the natural or scientific mode of fermenting the tobacco leaf. (1)

I am, dear Sir, yours truly,

M. LESSER.

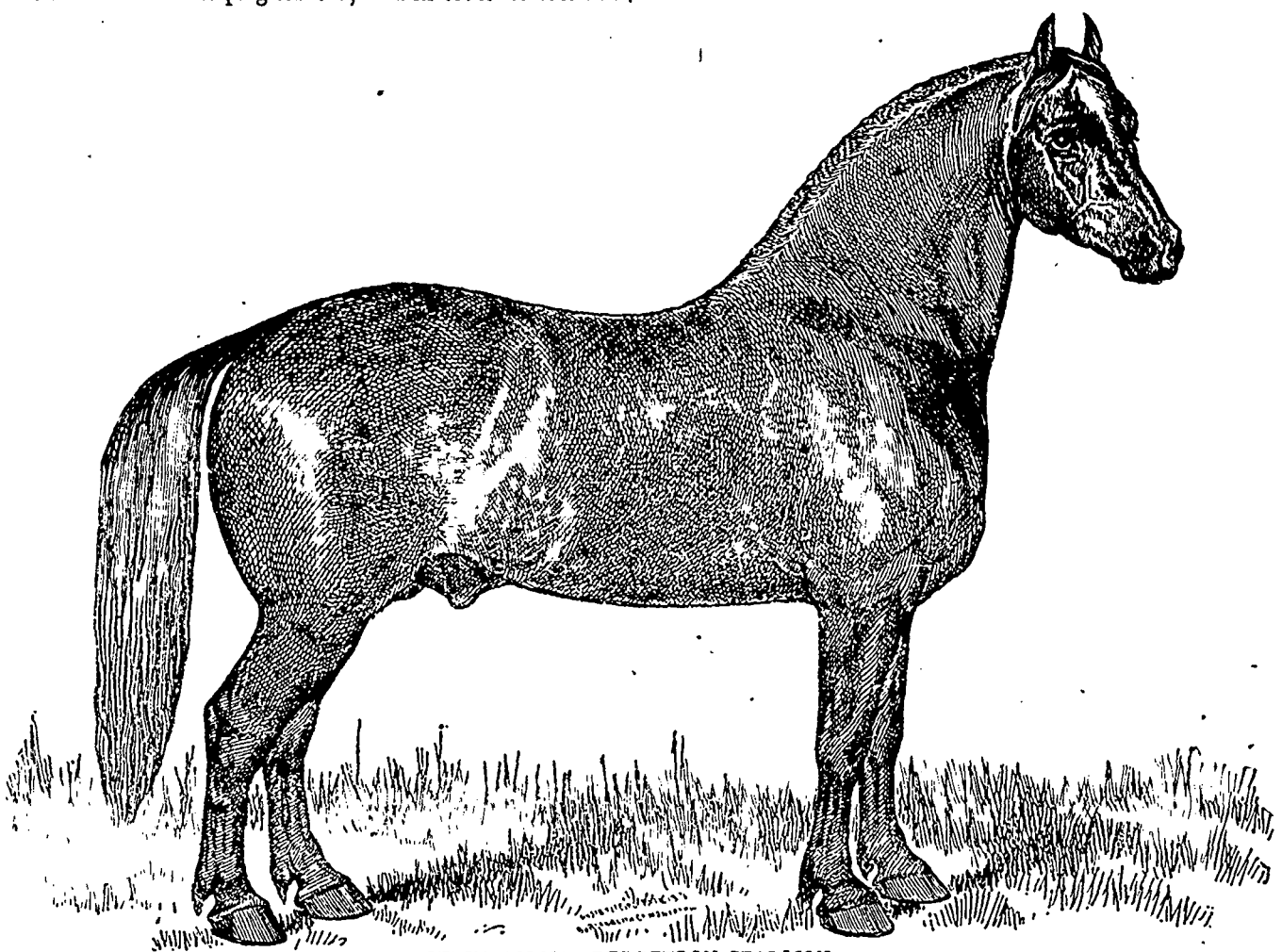
(1) Four samples of Canadian grown tobacco were sent me, last month, to try: Canada leaf, I could smoke; Havannah leaf was endurable; but the Virginia and Connecticut tobaccoes were so bad that, though I have been a regular smoker for more than 40 years, I would rather go without my pipe than use them. *All* blistered my tongue. A. R. J. F.

"SELIM."

Five years old 15¾ hands high weight 1340 lbs. [illegible]k iron gray, brought from Iowa. Bred from W. W. Durha[illegible]stock, Mayne Co. Ill. U. S. Brought to Montreal, Nov. 1[illegible]80. Serving at Richmond Agricultural Society, 1882.

R. J. LATIMER, Proprietor.

Brichton, Quebec.



SELIM NORMAN-PERCHERON STALLION.

The AGRICULTURAL REVIEW and Journal of the American Agricultural Association for May, will contain an exhaustive article on the Cattle Industries of the United States, by Hon. J. B. Grinnell of Iowa, giving a complete history of cattle breeding, the development of the industry, and a detailed description of cattle-raising on the Plains in the Western States and Territories; showing the lands best adapted to the business, and describing the methods of herdsmen owning from 500 to 20,000 heads each.

The number will also contain articles by Hon. Cassius M. Clay, Dr. Peter Collier, Prof. J. P. Stelle, Mr. T. Bowick, of England, Col. Robert W. Scott of Kentucky, Dr. E. Lewis Sturtevant, and other practical and scientific writers.

The January number and Supplement contained the proceedings in full of the Great National Agricultural Convention, recently held in New-York, including addresses and papers by Hon. J. F. Kinney, Francis D. Moulton, Dr. John A. Warder, Rear-Admiral Ammen, Gen. H. E. Tremain, Hon. N. T. Sprague, X. A. Willard, Seth Greene, and other leading writers and speakers.

The thirteen papers on Ensilage, giving full directions for growing the crop, building siloes, and preserving the fodder, by the ablest practical experimenters in the United States, comprising the fullest, most reliable and most valuable information on this subject yet published.

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The American Exposition of Products and Manufactures, being inaugurated by the Association, gives immeasurable value to the AGRICULTURAL REVIEW.

I hear sad tales about the failure of the grass. In many places the frost seems to have destroyed it.

Hungarian grass, sown thickly, say 3 to 4 pecks an acre will, in less than two months, produce a good crop of hay. It should be cut as soon as the blossom begins to show, as it is very hard if allowed to stand too long. The land should be in finest order and good condition. Sow broadcast, and brush in with bush-harrow, rolling afterwards when up. The yield, if the land is in good heart, should be from 1½ to 2 tons per acre. After cutting, if the land be reploughed, a second sowing may be made, which can be cut for green meat; in which case, 1 should use 2 pecks of seed, with 3 pounds of rape, to the acre.

KIND TREATMENT OF ANIMALS.

Among the legends of St. Francis, some of the more interesting are those which place him in relation with the lower animals. He was accustomed to call all living things his brothers and sisters. Hares and rabbits nestled in his bosom, but of all living creatures he seemed to have loved especially birds of every kind, as being the more unearthly in their nature, and among birds he loved best the dove. When he found insects on the ground he was careful not to tread on them, and would remove them from the pathway, lest they should be crushed by others.

Dr. Arnold wrote that the "destinies of the animal creation appeared to him a mystery which he could not approach without awe;" and, in like manner, John Henry Newman—"Can anything be more marvellous or startling, unless we were used to it, than that we should have about us a race of beings whom we do but see, and as little know their state, or can describe their interests or their destiny, as we can tell of the inhabitants of the sun and moon? They have, apparently, passions, habits, and a certain accountableness, but all is mystery about them. We do not know whether they can sin or not, whether they are under punishment, whether they are to live after this life."

Such thoughts as these ought to have weight with us, I am sure, in all our dealings with the dumb creatures of the hand of God. F. O. MORRIS.

Nunburnholme Rectory, Hayton, York.

I beg to call the attention of my readers to the following extract from the "Georgia Crop Reports." I need hardly say that I agree with the editor's remarks, except that, here, I should omit the cotton-meal, and add 200 lbs. of sulphate of ammonia per acre as a top-dressing. The last sentence is perfect. A. R. J. F.

Milton County.—"We are using Bradley's compost in this country. In my settlement there is nothing else used. Have discarded guano altogether. Farmers that used it last year say they could not tell the difference between the compost and the best guano. I will give you the formula: One thousand pounds stable manure, 1,000 lbs rich dirt or swamp muck, 5 bushels leached ashes, 8 lbs. of sulphate of ammonia, 8 lbs. sulphuric acid, 1 lb. powdered alum, well mixed, 400 to 500 lbs. to the acre. This compost cost but little over $1 per ton besides the labor, two hands can mix and put up six tons per day. If 1,000 lbs. per acre is used it will be much cheaper than guano. Some of my neighbors have used 1,000 lbs. per acre on oats and they look well." There is nothing in this formula to recommend it. The stable manure, rich earth, ashes, and sulphate of ammonia, of course, possess virtue. The stable manure, if properly saved, is indeed valuable, and rich earth, if used at the rate of many tons per acre, will produce appreciable results, but in the quantities recommended, can serve only as an absorbent of other valuable ingredients, which in this case are used in very small quantities. For instance, 8 lbs. of sulphate of ammonia will furnish, if pure, only 2.06 lbs. of ammonia or a fraction less than 1-1,000 p. c. This will do no harm. The percentage of phosphoric acid derived from the stable manure and ashes will be hardly appreciable—less than one per cent. The soluble potash is leached from the ashes before used to prevent, it is supposed, the loss of ammonia, while a microscopic homeopathic dose is given in "one pound" of powdered alum. If our correspondent will substitute 1,000 lbs. of cotton seed or half the weight of cotton seed meal for the rich earth, replace the ashes with 300 lbs. of kainit, and add 500 or 600 lbs. of high grade superphosphate, he will have a better compost, which will indeed be equal in agricultural value to the best commercial manures, and one which may be used at the same rate per acre at which commercial fertilizers are usually applied. *The feat of making something out of nothing has not yet been accomplished*, and our correspondent is advised not to undertake it.

Coal-oil Cooking Stoves.

I have used a coal-oil cooking-stove from Mr. Cole's establishment for the last four years. It is no trouble to manage, and its performances are as great as the promises of the advertisement, q. v. Its *stewing* and *broiling* are exquisitely perfect. Care is of course required in keeping the flame at a proper height. A. R. J. F.

Poultry Department.

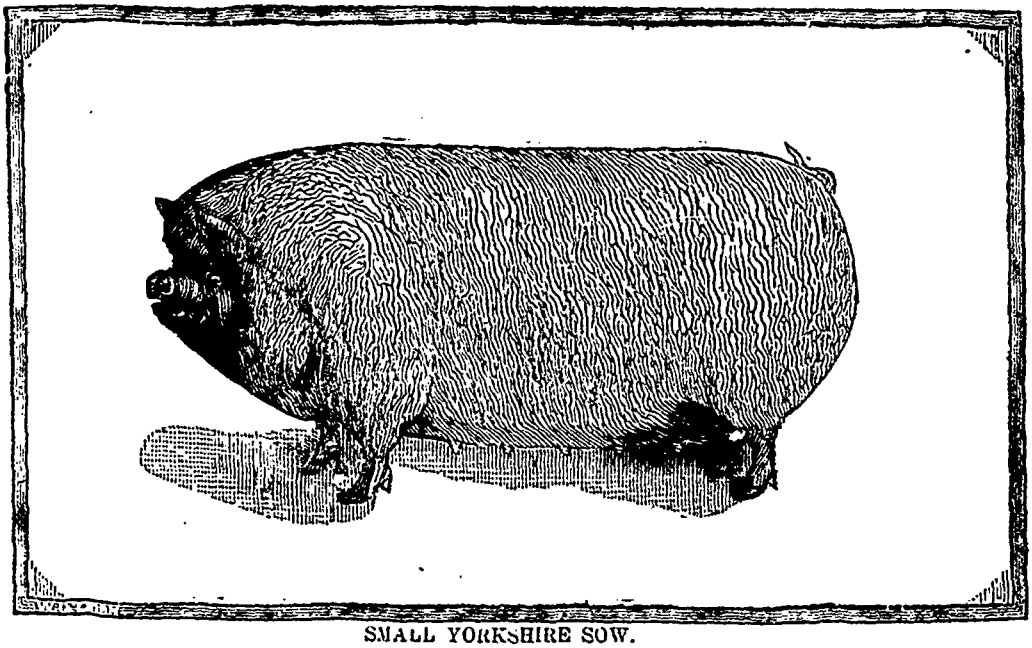
Mr. Tegetmeier on the Management of Poultry.

(continued.)

Resuming yesterday (Thursday), Mr. Tegetmeier dealt with the first and second heads of his syllabus—(1) the origin of domesticated fowls, and (2) the structure of fowls. As to the former, he said there were only four wild fowls—viz., *Gallus Ferrugineus*, *Gallus Varius*, *Gallus Sonneratii*, and *Gallus La Fayettei*, all of which belonged originally to the East. From one of these our domesticated varieties must have arisen, and to a great extent they no doubt had their origin in the one first-named, which was very much like the black-red Game cock, almost the only difference being that the tail of the wild bird was somewhat drooping. In passing, he might say that the prevalent idea that many of the domestic varieties were the result of a cross between fowl and pheasant

was altogether delusive, for the product of union between these two birds was a perfectly sterile mule. All four of the wild fowls were called *jungle*-fowls, because they lived in the woods, and as they were able to fly as well as pheasants they were not remarkably easy to shoot (1). They were polygamous —*i. e.*, one male consorted with several females. When a hen had laid her tale of eggs—not very many in number, for she only laid as many as she could cover—she retired from the flock, and devoted herself to the business of hatching them and bringing up her young. The wild fowl's habit was to roost on high but small branches of trees—branches not much thicker than one's finger; and there was a marvellously beautiful arrangement by which, as it sank down, its toes involuntarily closed around the branch. Thus the breast was relieved from pressure. This was a point of some importance. Many poultry-keepers created the very evil they wished to avert by providing their birds with broad flat benches to rest upon. The consequence was that the closure of the toes became impossible, and the whole weight was thrown upon the breastbone, which became flattened. Nothing could be more erroneous than the notion that each of our domesticated breeds had a distinct wild original, the fact being, as he had before said, that in the main they had all descended from the *Gallus Ferrugineus*. The proof of this was that if you bred from a Cochin and a Spanish, the buff of the one and the black of the other would gradually disappear, and by the tenth generation the colours would be identical with those of the *Ferrugineus*. He well remembered the time when a Spanish fowl with a white face was not to be seen; now such birds were common enough. The white ear-lobe was thought pretty by the fanciers, who bred from those birds which had the larges lobes, and now there were white ear-lobes four inches long. When a given trait was very highly developed, people were accustomed to speak of the bird as belonging to a pure breed. Strictly speaking, however, the wild original was the only pure breed. The wild fowl weighed only about 3½ lbs., the Cochin China weighed 17 lbs.; this was the result of the practice of the Chinese, extending over thousands of years of breeding from the largest specimens they could get. Scores of varieties had been produced within his recollection. A few years ago, for instance, Bantams were unknown. Brahmas, again, were the product of American ingenuity. Sometimes it was utility that was aimed at, sometimes appearance. For his own part, while not insensible to the beauty of a Game cock or a silver-spangled Hamburgh, he thought the most important thing was to breed fowls with large breasts for the table. At the back of his house was a wood, in which he kept his poultry. The results were much better than could accrue if fowls were kept in a state of confinement, as an instance of which he might mention that almost every one of the eggs laid by his birds was successfully hatched. He strongly advised that, where it was possible, fowls should be allowed to roost in trees, as they did in a state of nature. There need be no fear of rain or snow; the birds would enjoy vigorous health, their feathers would be bright and shiny, and their general condition would be as excellent as that of the pheasant. If poultry must be kept in a hen-house, care should be taken to avoid overcrowding.

(1) Oh! Any man who misses a pheasant within 45 yards, except by an accident, an interrening tree, or so, must be a regular muff.
A. R. J. F.



SMALL YORKSHIRE SOW.

Hardly anything was of greater consequence in hatching than that the eggs should be kept in a pure air. It was not generally known that the shell was porous, and that from its very earliest development, while yet within the egg, the chicken breathed; and in this incipient stage it was so susceptible of injury as to be most prejudicially affected by impure air. Great mistakes were made, again, in the matter of feeding. Here, also, the object should be to imitate nature. In a wild state fowls did not eat meat or artificial meal. They consumed worms (which furnished the very best part of their diet), small snails, beetles, butterflies, etc., as well as green stuff and seeds. The seeds, however, were not hard and dry. The wild fowl was never crop-bound, for it was not so foolish as to eat half a pound of dry maize. Reverting afterwards to the crop, in describing, with the aid of diagrams and a dead specimen, the structure of the fowl, the lecturer said that when a bird was crop-bound an incision should be made in the skin, and then in the crop itself. After the compacted mass of food had been withdrawn, the rent should be sewn up with two or three stitches—separate, not connected—and the fowl fed for a time on a soft diet, such as bread and milk. As showing how little injury the bird suffered from the operation, he said he had heard of cases in which

the crops of game cocks had been opened just before they were set fighting—in order to extract the food, which would otherwise have impaired their chances of victory. The immense muscular power of the gizzard was commented upon, and it was mentioned that not only the food but the stones and pieces of quartz which were swallowed were ground up by this organ. In plantations, nothing was more common than for pheasants to be poisoned by the shots they swallowed, and in some cases considerably over a hundred were found in the gizzard. The practical inferences to be drawn from the structure of the fowl was that when hungry the bird should never be fed to excess with hard corn; nor directly after a meal of this kind should it be supplied with water, which caused the grain in the crop to swell; or should it be fed too much upon meat. Stimulating foods should be avoided, for their tendency was to throw the liver out of order, and care should be taken to give a sufficiency of green meat.

FEEDING CHICKENS.

SIR.—*A propos* of what you say on chicken-feeding, I think you may be interested in the printed hours, &c, for the management of artificially-reared chickens, that I arranged for the use of my own poultry maids last year. I lay great stress on the day *rests*, and, you will see, go rather by the state of the feathering than by the exact age, in diminishing the time of feeding. I find it useful to name the chicks of different stages differently. The papers are intended to hang up, and to be filled up with changes of food in pen and ink.

MAY ARNOLD.

P. S.—I think your correspondent M. D.'s chickens were backing from a cold quarter. A regular stampede may be heard amongst chicks in a brooder on a dubiously warm night if the door of it is turned to a draught. A shutter to the inlet, and overhead ventilation only, are his remedies.

WHAT TO GIVE HATCHLING CHICKS.

(Age between first running and wings growing to meet.)

In first brooder, before they can run, no food first 24 hours after hatching; then egg minced, egg and bread crumbs, or egg and fine meal, a very little at hours as below. Eggs to be boiled so as white neither wet nor leathery. Chicks must be lifted now and then out of first brooder into air for a few minutes.

Snipped fresh grass with every meal but first and last. Avoid coarse or wiry grass.

Food not to be kept in chick-house, but bruised fresh to requirements. Any little over to be kept in kitchen. Food to be swept up, if any left when pecking stops.

To take their day rest twice Get into park round brooder for it. Let out for ten feed.

FEEDING HOURS CHRISTMAS TO LADY-DAY.

Quarter-past six.
Half-past seven.
Quarter to nine.

FEEDING HOURS FROM LADY-DAY THROUGH SEASON.

Half-past five, or first light.—Food.
Seven.—Food.
Half-past eight.—Get in to feed for first day rest. Food.
Ten.—Let out for feed. Food.
Half-past eleven.—Food.
Two—Get in to feed for second day rest. Chicks' water-pans refreshed. Food.
Half-past three—Let out for feed. Food.
Five.—Food. Gather chicks' water-pans outside houses for cleaning and re-filling.
Nine.—Carry in chicks' water-pans. Food. (Milk, some sups from spoon to weakly chicks only.)
(Over for first light of morning.)—Food.

WHAT TO GIVE FLEDGLING CHICKS.

(Age between growing wings and growing head feathers.)

Over much food, if any, swept away between meals when pecking stops. Snipped fresh grass, even when on grass in run, unless that under them purely fresh, green, and clean. Pounded shell with food once or twice. Boiled potatoes, or other root, once.

FEEDING HOURS (AFTER HATCHLINGS AT THE HOURS BELOW GIVEN.)

Half-past seven before Lady-day, seven after it. Food.
Ten.—Get into shed to feed and shut up there for day rest, but do not close park round brooder. Food.
Half-past eleven.—Let out, but do not feed.
Two.—Refresh water-pans. Food.
Five.—Food. Gather chicks' water-pans outside houses to clean and re-fill same time as those in runs.
Nine.—Carry in house water-pans. Food.

WHAT TO GIVE SORTED CHICKENS.

(Cockerels and pullets put in separate houses and runs as soon as heads well feathered and head-flue gone.)

No longer require brooder, but must not perch. Rest if cold weather in large boxes, else on wide boards. Box bottoms and boards truly levelled, to help to straight growth. Let out first thing unless intolerable weather. No food let lie between meals.

FEEDING HOURS.

Seven (after Hatchlings and Fledglings).—Food.
Half-past eleven.—Food.
Two.—Refresh water-pans.
Five.—Soft food, with powdered shell or bone dust. Clean and re-fill water-pans.
Nine.—Carry in some water-pans for use after first light feed if shut up. Food.
Over for first light of morning.—Food.

AGRICULTURE.

PARIS, MARCH 25.

The *Société des Agriculteurs* has held its annual Congress, and discussed several questions of general interest. In the case of wheat, it was admitted that much could be done to increase the yield, and so combat the effects of imported bread stuffs, by each agronomic station conducting experiments, bearing on varieties and suitable manures. Care should be taken not to employ fertilizers too immediately soluble, more especially of a nitrogenous character, which would provoke the laying of the crop.(1) A motion was carried inviting railway companies to establish in some of their principal stations a meteorological office. Respecting manures for vines; those of potash salts, under the forms of sulphates and chlorides, were to be preferred, and eminently suited to vines under treatment against the phylloxera. The superphosphates soluble in citrate of ammonia (reverted), possess the same agricultural value, as the same salts soluble in water.(2) On the important subject of ensilage, it was decided, that the plan deserved adoption; that every kind of green stuff admitted of such treatment, even to rushes, vine leaves, crushed or cut; it is not absolutely necessary for the successful preservation of green fodder, to mix it with dry matter-straw, chaff, etc, or to employ even salt: when coming into flower, is the best period for cutting forage intended for trench preservation, and that neither rain nor dew interferes with that conservation. No special kind of trench is necessary, but such as are constructed in masonry, have ever given the best results; the great aim is to exclude the air; the fodder ought to be placed in

(1) That is, I suppose, not to employ them too largely. A. R. J. F.
(2) Hardly at all events, *reverted* ph. acid is 4c a pound cheaper in the market. More about it in our next. A. R. J. F.

the trench regularly; chaffing the fodder is not indispensable, save in the case of the thick stems of maize and Jerusalem artichokes. The alimentary value of the forage, approaches more to that in its fresh, than in a faded condition (*i. e. ensilaged grass is better than hay*). The subject of agricultural education received much attention, and a petition was drawn up, that the state, not the locality, ought to defray the expenses of such instruction in the case of the primary schools. M. de Haut made some curious observations respecting the flooding of vineyards in the Crimea. In France, that operation is employed as a remedy against the phylloxera, and is familiarly known as the *Faucon* process; but in southern Russia the plan has been found to improve the quality of the fruit.

For sick horses carrots constitute a favorite diet: now, this mild winter, that root has prematurely decayed, and many farmers are desirous of obtaining a substitute. M. Boussingault suggests Jerusalem artichokes, but admits that the peculiar character of the tuber renders cleaning a very difficult operation. M. de Béhagne removed the difficulty by placing the roots in heaps, leaving the rain to wash them, which it did so effectually as to satisfy his sheep.

A discussion is taking place as to the best period for castrating bulls; ordinarily, those intended for the butcher are cut at the age of five or six months, on the ground that the animal then exacts less nutrition. Animals thus treated fatten rapidly, but if destined for work, they will be found deficient in ardour and strength. In some regions the bulls are never castrated; they are thus unquestionably better fitted for work, though difficult in point of docility; but as for fattening, that is out of the question. Experience however indicates, that castration can be best effected between eight and ten months, when the animal exhibits signs of puberty; will prove easy to fatten or will take to draught work with facility. In any case bullocks intended for labor ought to be well fed from their earliest age.

The *Départementales* Agricultural Societies in order to bring home to farmers the valuable lessons of M. Pasteur's experiments, are organizing special meetings, where the process of vaccination, in its mild and virulent forms, can be demonstrated, and an autopsy made on the victims of the *charbon* disease. I may observe, that foreigners who desire to have the inoculation tested in their own countries, can arrange with Mr. Pasteur, who will send his authorised representatives to conduct the operations. Young Vets can receive also special instruction how to conduct the experiments.

The only point not yet established in Mr. Pasteur's important discovery, is the duration of the efficacy of the inoculation. To solve this point, the agricultural school of Montpellier has set aside a lot of 36 sheep: six to be operated upon each year, during a period of six years.

At the recent agricultural show held in this city, one of the chief proofs of progress and prosperity, consisted in the marked attention devoted to the machinery department: farmers gave orders freely: French implement makers have now almost accomplished their education, thanks to foreigners so liberally supplying them with the means of study. If native machinery be not so highly finished or so cheap as its rivals, it is undoubtedly strongly made, wears well, the quality which guided the Vicar of Wakefield's wife in the selection of her gown. Nor are the French manufacturers behind in innovation. Mr. Debains, for example, has improved the steam plough for breaking up new lands in Algeria, where palm and other scrub, are the chief difficulties against reclamation. His machine is made in forged iron and steel, very solid, and the sock descends to 14 inches in the soil, and can be arranged to penetrate to 20. M. Puzeuta, has introduced ameliorations in the chain harrow, which impart great elasticity; he replaces the movable bar by an assembly of bars, all of which are however independent, and preventing the teeth from following in indentical wakes. The manure distributer of Mr. Couteau, has the drums so arranged, that the quantity of fertilizer distributed, over a width of 88 inches, is regulated with mathematical accuracy, following the rapidity with which the horse travels; and whether the fertilizer be dry or pasty. Mr. Douten has invented a very ingenious beet dibbling-machine. The drums can be set to meet a specified distance, for opening the holes in the soil; then the seed is dropped in, and a small layer of fine earth covers it: by an endless screw arrangement, a certain quantity of manure can be simultaneously deposited.

The exhibition in question appears to have almost convinced the very incredulous, that the best means to ameliorate live stock in France, is by crossings with English pure breeds; this is a truism in the case of pigs, and nearly so of sheep: the fact is becoming apparent, despite all *chauvinism*, for cattle as well.

The state of the winter crops is satisfactory so far, but if the drought, which has reigned throughout the winter, continues, the consequences will be serious for spring sowings. Water is necessary for germination, hence, farmers demand rain. In respect to the preparation of the soil, nothing remains to be desired.

The cultivation of beet root, at present a monopoly in the north of France, is rapidly extending to the east and centre. Societies are being established not only to work up the roots, but to grow them. The aim of French cultivators now is, to produce a root containing one per cent more in yield of sugar; which is a superiority that the German farmers at present possess.

The common enemy, the phylloxera, has encountered a new remedy, in the employment of bitumen against its ravages. So far back as 1879, that agent was spoken of favourably, especially such as was imported from Judea. Sulphuret of carbon is still, however, regarded as among the perfect cures, double the quantity of that high priced chemical being employed in 1881 as compared with the previous years. The government and the railway companies contribute liberally to testing all practical remedies. Nothing serious is now attached to the vines of Soudan and Cochin China; American stocks alone are in favor; the others are but curiosities.

Mr. Planchon attributes the plague to which the chestnut trees are subject, to a microscopic fungus feeding on the roots: the same as that which created such havoc in the pine forests of Germany a few years ago. Mr. Bella draws attention to the depredations of rats in trees growing along the banks of rivers; the animals in winter, when short of food, feed on the roots and so kill the trees.

BEER.

To make good *table-beer*, take one bushel of malt, crushed but not in meal, and two pounds of hops. In the bottom of a tub holding 25 gallons make a hole about an inch in diameter, and fit to it a wooden-plug three feet long, lightly wrapped round with straw. Pour into the tub 8 gallons of boiling water, and when the temperature has fallen to 180° F., shoot the malt in and stir it up, mashing the whole with a stick and a rake until no lumps remain. Now, add four gallons of *boiling* water, sprinkling it from the rose of a watering pot, and mash again.

After letting the mash stand for two hours, well covered up, raise the plug slightly at first, and run off the extract or wort. When dry, replace the plug, and sprinkle the surface of the malt with 5 gallons of *hot* water (200° F.); run this off as before, and get the two lots of wort on to boil as fast as possible.

Sprinkle 5 gallons more water—cold if you can't conveniently heat it; run off the wort and add it to the rest. In both the last sprinkles (sparges), the water must be allowed to penetrate the malt of its own accord—the malt must never be disturbed after the first repose—and the plug must not be drawn until the water has disappeared. Put half the hops to the wort and boil for an hour; add the rest, and, after boiling for a quarter of an hour, strain off the hops in a wire sieve, and set the wort in any shallow vessels you may have to cool down to 65° F.

Wash out the mash-tub; mix in it half a pint of brewer's yeast with the wort, and cover up. After two days put the beer into a barrel that will just hold it, and as it works over, return it, every hour at first, and then four times a day. Bung up when quiet. In ten days the beer will be fit to drink, and, if this recipe is followed strictly, nothing can be more delicious.

Intense cleanliness is absolutely necessary, and the quicker the whole can be got through, the less chance there will be of souring. Brewer's yeast can always be had in Montreal; baker's yeast is utterly useless. Keep the mash-tub during *the repose* as warm as possible. The reason why such very small quantities of beer are extracted generally from the malt by private brewers is, that they will mash a second time. The sprinkling washes the whole available extract out of the malt by the force of gravity. I have brewed all quantities of malt, from half a bushel, up to 200 bushels, and this is the fullest information I can give.

ARTHUR R. JENNER FUST.

How to have pure, sweet milk.

The following rules prescribed by a large New York company, which owns twenty creameries, are offered for the consideration of our friends in the milk business:

RULES.

1. Never under any circumstances pour a pail of milk into your can before straining. One pail of unstrained milk may spoil a whole can, and one can of impure milk will certainly injure all milk or cream with which it comes in contact. In the name of decency, we beg of every patron to be particular about milking and properly straining his milk.

2. Cans containing milk should never be kept in a milking barn during the night. The scent of the stable (however well kept) will injure the milk and spoil the nice flavor fresh butter should have. An open shed a little distance from your barn, your woodshed or your kitchen, is the only proper place for keeping milk overnight.

SUGGESTIONS.

1. Insist that your milking be done in a cleanly manner. Too much pains cannot be taken in this particular. Carelessness here will entail a great loss on the manufacturer and insult the consumer.

2. Bed your cows with sawdust, if possible; it will keep your cows clean and the stable sweet.

3. Do not, under any circumstances, leave your pails and strainer at the barn overnight. Please carry them to the house and insist that they be properly washed both morning and evening. Much depends on this.

4. Use only tin pails for milking.

5. The tin strainer pails are the best for straining milk. Some dairymen use strainer pails and also a cloth stretched over the can—thus straining the milk twice. We advise this double straining of milk. It costs you but little trouble while it will greatly add to the value of the butter and cheese made from your milk—*Ex.*

Extracts from "Farming as it should be."

Nearly every farmer's boy took an oath that he would never cultivate the soil. The moment they arrived at the age of twenty-one they left the desolate and dreary farms, and rushed to the towns and cities. They wanted to be book-keepers, doctors, merchants, railroad men, insurance agents, lawyers, even preachers, anything to avoid the drudgery of the farm. Nearly every boy acquainted with the three R's—reading, writing and arithmetic—imagined that he had altogether more education than ought to be wasted in raising potatoes and corn. They made haste to get into some other business. Those who stayed upon the farm envied those who went away.

A few years ago the times were prosperous, and the young men went to the cities to enjoy the fortunes that were waiting for them. They wanted to engage in something that promised quick returns. They built railways, established banks and insurance companies. They speculated in stock in Wall street, and gambled in grain at Chicago. They became rich. They lived in palaces. They rode in carriages. They pitied their poor brothers on the farms, and the poor brothers envied them.

But time has brought its revenge. The farmers have seen the railroad president a bankrupt, and the road in the hands of a receiver. They have seen the bank president abscond, and the insurance company a wrecked and ruined fraud. The only solvent people, as a class, the only independent people, are the tillers of the soil.

Farming must be made more attractive. The comforts of the town must be added to the beauty of the fields. The sociability of the city must be rendered possible in the country.

Farming has been made repulsive. The farmers have been unsociable, and their homes have been lonely. They have been wasteful and careless. They have not been proud of their business.

No farmer can afford to raise corn and oats and hay to sell. He should sell horses, not oats; sheep, cattle and pork, not corn. He should make every profit possible out of what he produces. So long as farmers ship their corn and oats, so long they will be poor; just so long will their farms be mortgaged to the insurance companies and banks; just so long will they do the work, and others reap the benefit; just so long will they be poor, and the money lenders grow rich—just so long will cunning avarice grasp and hold the net profits of honest toil. When farmers ship beef and pork instead of grain—when we manufacture here—when we cease paying tribute to others, ours will be the most prosperous country in the world.

Another thing: It is just as cheap to raise a good as a poor breed of cattle. Scrubs will eat just as much as thoroughbreds. (1) If you are not able to buy Durhams and Alderneys, you can raise the *corn-breed*. By "corn-breed" I mean the cattle that have for several generations had enough to eat, and have been treated with kindness. Every farmer who will treat his cattle kindly, and feed them all they want, will, in a few years, have blooded stock on his farm. All blooded stock has been produced in this way. You can raise good cattle just as you can raise good people. If you wish to raise a good boy you must give him plenty to eat, and treat him with kindness. In this way, and in this way only, can good cattle or good people be produced.

Another thing: You must beautify your homes.

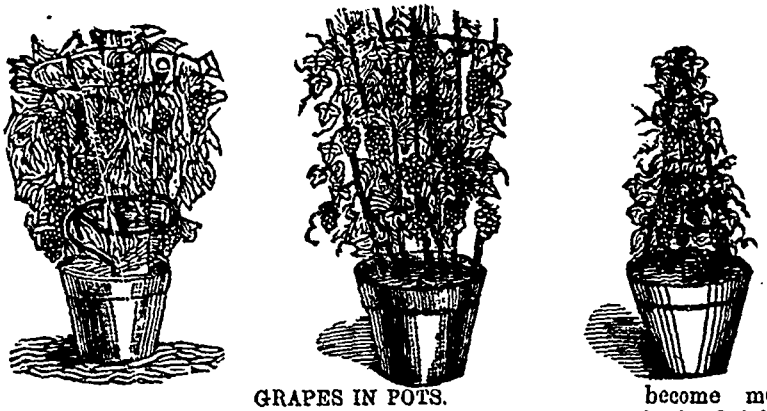
When I was a farmer it was not fashionable to set out trees, or to plant vines.

When you visited the farm you were not welcomed by the

(1) A good deal more, too.

flowers, and greeted by trees loaded with fruit. Yellow dogs came bounding over the tumbled fence like wild beasts. There is no sense—there is no profit—in such a life. It is not living. The farmers ought to beautify their homes. There should be trees and grass, and flowers and running vines. Everything should be kept in order; gates should be kept on their hinges, and about all there should be the pleasant air of thrift. In every house there should be a bath-room. The bath is a civilizer, a refiner, a beautifier. (2) When you come from the fields tired, covered with dust, nothing is so refreshing. Above all things, keep clean. It is not necessary to be a pig in order to raise one. In the cool of the evening, after a day in the field, put on clean clothes, take a seat under the trees, 'mid the perfume of flowers, surrounded by your family, and you will know what it is to enjoy life like a gentleman.

Farming must be more attractive. Those who work the land must have an honest pride in their business. They must educate their children to cultivate the soil. They must make farming easier, so that their children will not hate it themselves. The boys must not be taught that tilling the soil is a curse and almost a disgrace. They must not suppose



GRAPES IN POTS.

that education is thrown away upon them unless they become ministers, lawyers, doctors or statesmen. It must be understood that education can be used to an advantage on a farm. We must get rid of the idea that a little learning unfits one for work.

I say again, if you want more men and women on the farms, something must be done to make farm-life pleasant. One great difficulty is that the farm is lonely. People write about the pleasures of solitude, but they are found only in books. He who lives long alone becomes insane. A hermit is a madman. Without friends and wife and child, there is nothing left worth living for. The unsocial are the enemies of joy. They are filled with egotism and envy, with vanity and hatred. People who live much alone become narrow and suspicious. They are apt to be the property of one idea. They look upon the happiness of others as a kind of folly. They hate joyous folks, because, way down in their hearts they envy them.

It is not necessary in this age of the world for the farmer to rise at the middle of the night and begin his work. This getting up so early in the morning is a relic of barbarism. It has made hundreds of thousands of young men curse the business. There is no need of getting up at three or four o'clock in the winter morning. The father who persists in dragging his wife and children from their beds ought to be visited by a missionary. It is time enough for one to rise after the sun has set the example. For what purpose do you get up? To feed the cattle? Why not feed them more the night before? It is a waste of life. In the old times they used to get up about three o'clock in the morning and go to work long before the sun had risen with "healing upon his wings," and as a just punishment they all had the ague; and they ought to have it now. The man that cannot get a living upon American soil without raising before daylight, ought to starve. Eight hours a day is enough for any farmer to work except in harvest time. When you rise at four and work until dark, what is life worth? Of what use are all the improvements in farming? Of what use all the improved machinery, unless it tends to give the farmer a little more leisure? What is harvesting now, compared with what it was in the old time? Think of the days of reaping, or cradling, or raking and binding and mowing. Think of threshing with the flail, and winnowing with the wind. And now think of the reapers and mowers, the binders and threshing machines, the plows and cultivators, upon which the farmer rides protected from the sun. If, with all these advantages, you cannot get a living without rising in the middle of the night, go into some other business. You should not rob your families of sleep. Sleep is the best medicine in the world. There is no such thing as health without sleep. Sleep until you are thoroughly rested and restored. When you work, work; and when you get through, take a good, long and refreshing sleep.

The farmer has been elevated through science, and he should not forget the debt he owes to the mechanic, the inventor, the thinker. He should remember that all laborers belong to the same grand family—that they are the real kings and queens, the only true nobility.

Cooking is one of the fine arts. Give your wives and daughters things to cook, and things to cook with, and they will soon become most excellent cooks. Good cooking is the basis of civilization. The man whose arteries and veins are filled with rich blood made of good and well-cooked food has pluck, courage, endurance, and noble impulses. Remember that your wife should have things to cook with.

In the good old days there would be eleven children in the family and only one skillet. Everything was broken or cracked or loaned or lost.

There ought to be a law making it a crime punishable by imprisonment to fry beefsteak. Broil it; it is just as easy, and when broiled it is delicious. Fried beefsteak is not fit for a wild beast. You can broil even on a stove. Shut the front damper—open the back one, then take off a griddle. There will be a draft downwards through this opening. Put on your steak, using a wire broiler, and not a particle of smoke will touch it, for the reason that the smoke goes down. If you try to broil it with the front damper open, the smoke will rise. For broiling, coal, even soft coal, makes a better fire than wood. (From *The Southern Planter.*)

(2) Fifty years ago, the daily use of the bath was almost unknown in England. Now, a gentleman who does not *tub* every morning would be looked upon as a Yahoo.

A Canadian warehouse and manufactory of Agricultural Implements.

We gave, in our April number, a few engravings of agricultural implements, to which we attach great interest, coming, as they do, from the well-stocked warehouse of Messrs. Côté & Co., St. Paul's Street, Quebec. When we visited this establishment a few weeks ago, we found there a most complete assortment of the best agricultural implements, including ploughs, harrows, etc., for sale at very moderate prices. M. Samuel Vessot, formerly of Joliette, a skilful mechanic, has just en-

tered the firm, which will be known for the future as the firm of Côté & Vessot. The latter gentleman is the inventor of the excellent sowing-machine which bears his name, and of which we, after many trials, have every reason to speak well.

At our request, the firm has agreed to supply any member of the agricultural clubs with their implements at wholesale prices. It must be thoroughly understood, however, that this advantage can only be claimed by *bonâ fide* members of regular associations, and the terms of payment will be cash on delivery.

We repeat now what we have often said before, that the union of the several members of an agricultural club for the purchase of implements of the more expensive style is an advantage not to be neglected.

I can recommend a *thorough* gardener. An Englishman, in Montreal since last August. Trust worthy, sober, and well mannered. I have seen his work almost daily, and I entertain a high opinion of him in every respect.

ARTHUR R. JENNER FUST.