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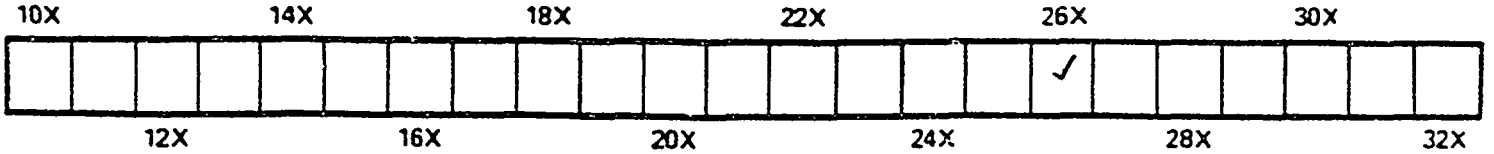

THE JOURNAL of AGRICULTURE. ILLUSTRATED

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

OFFICIAL PART.

Table of Contents.

The Fruit-growers Meeting will be held at Quebec on the 1st and 2nd of February next.

Box 109, Upper Lachine—December 1st, 1887.

Lachine Farms.—I do not imagine that Lachine is windier than any other lake-side place, but it has never been my fortune to live in any situation where the S. W. wind is more persistent. To an English ear, that sounds like a pleasant, zephyr-like breeze, not to be complained of, but, on the contrary luxuriated in. Here, however, it comes sweeping up from the funnel-shaped end of Lake St. Louis, and gaining strength from the impetus behind it, penetrates every nook and cranny of the houses. My habitation is of good sound brick, well built, and with tightly fitting doors and windows; so, I cannot grumble. But some of my neighbours are passing the winter in cottages built solely for summer visitors, and I do not like to think of their sufferings. If the farmers of the district do not cut their grain pretty green, I fancy they may spare themselves the trouble of threshing it.

The Messrs. Dawes, of the Lachine Brewery—and mighty nice tipple they make there, *I am told*, for, alas, my guide, philosopher, and friend, Dr. Johnstone, of Sorel, has strictly forbidden me to drink beer, which is rather a bore, after 60 years habitual use of it!—the Brothers Dawes, I say, are the principal farmers of the parish. They occupy about 300 acres of land, some of it, chiefly in pasture, lying on the north side of the Grand Trunk railway, but the greater part is situated between that line and the St. Lawrence. The exposure is about S. W., with a gentle slope down to the flat lands by the riverside, with a splendid sugar-bush crowning the table-land on the north, and a station—which, by the by, was burnt to the ground yesterday—within 200 yards of the main farm-buildings. Unfortunately, the farms I am speaking of do not lie together; a nuisance for Mr. Tuck, the very energetic foreman, who has, I imagine, about as arduous a task to perform as any man in the province.

Three breeds of horned stock are kept: Herefords, Jerseys, and Polled-Angus; Berkshire pigs, the herd of which has long been noted as prize-winners at the Montreal exhibitions; thoroughbred horses and Clydesdales, but, I am sorry to say, not one sheep. One pair of the dray-horses is remarkable for power and quick-stepping action.

Four or five acres of hops and a good lot of barley are grown for the use of the brewery. The hops seem to be a mixed lot; they may have run out during the number of years they have been in cultivation here, or, perhaps, plants for filling up may have been brought from other places. At all events, I could not tell what sorts they were, and, as is always the case with a mixture, they ripened very unevenly. The

garden was as clean at picking time as could be. but I should like to see the ground a little finer. There might have been 6 cwt. to the acre, a fair crop enough for the country.

Water is furnished to the buildings by windmills pumping from wells. This summer and autumn, here as elsewhere, the wells have been dry, and many a thousand puncheons have been filled at the river. They talk about water-works being established by the corporation; but the rock is so very near the surface that it would be, I fear, too expensive a job for a place of no commercial importance, like this.

A field of a dozen acres or so was devoted to the root-crop this year: an utter failure all over, I regret to say. The mangels were destroyed by the outworm, the swedes by the turnip-beetle, and the Belgian carrots were checked in their growth by the drought. The preparation of the land for these crops was not quite what it ought to have been. The manure applied was rich and abundant, but the pulverisation of the soil by no means complete. As the first sowing of the greater part of the swede division was entirely destroyed by the *haltica*, a second sowing was made, unfortunately on the same surface as the former. Now I never saw this mode of procedure answer. The first sowing of any root-crop failing, the only chance of a successful second sowing is to pull the drills completely down to the manure, and re-shape them with the double mouldboard plough. Again, when the first sowing of mangels fails, there is no use in re-sowing with the seed of that plant, as it takes a long time to come up, and the crop, even if full of plant, can never be worth growing Mangels failing, swedes should take their place; just as, if swedes, unless sown very early, fail, white turnips should take their place.

Mangels ought to do well on these farms, as the Messrs. Dawes have in their farms a most valuable manure for that crop: the rootlets of the malt, commonly called *cummins*. The sweepings of the malt kiln *under* the wire will be found full of half-burned rootlets and ash, which on land in good heart, applied at the rate of 25 bushels an acre, would alone produce a fair crop of white turnips. Had I these valuable matters in hand, I should use, for mangels, the following dressing:

Dung.....	20 Scotch-cart loads
Sulphate of ammonia....	1 cwt.
Kiln sweepings.....	10 bushels
Cummins	10 do.

As it is clear that the mangel plant requires something to push it quickly out of the way of the enemies that attack it in its youthful stage of growth, I venture to propound the addition of the above dose of forcing manure. The cummins are very rich in nitrogen, and we have every certainty that the mangel is chiefly dependent upon that constituent for its yield.

The whole of the land devoted to root-crops was kept perfectly clean throughout the summer, but the horse-hoeing might have been deeper with advantage, and the drills were not pulled down enough.

The cultivation of the potato-crop Mr. Tuck evidently understands thoroughly. The plant was perfect, the land well stirred, not a weed to be seen. and, with every disposition to find fault, I can only say that I should not have earthed up quite so high. The general crops on the farms were very good, particularly a piece of barley on the Cross farm, though the seed was mixed 6-rowed and 2-rowed, which will tell a tale on the malt-floors. Some *White Tartar* oats promised to yield well, but in this country I prefer the Black Tartars.

As for the grass-land, no special remarks are called for, except that the pastures are rather vaguely treated, that is, they are not regularly fed down. This is probably owing to the scarcity of water, the gates being left open to allow the cattle to find their way to *the* pond when they wish to drink. In such a dry summer as the past, one cannot be extreme to mark little defects of this sort. One piece of permanent-pasture near the farm-buildings kept a surprising lot of mouths going in the driest part of the year, to the great astonishment of Mr. Tuck, the foreman, who is an Englishman, from the county of Hertford, and must know from experience what permanent pasture means.

There is no silo. Fodder-corn, on the Cross farm, was an abundant crop, partly cut for green-meat, partly dried for after consumption. Sown in drills 16 inches apart, with no after cultivation. A large piece of tares and oats sown in succession; a second crop, of white turnips, might have been had after the greater part of this was cut.

Hay allowed to stand too long before cutting. On such a large occupation as this, if the hay-season is not begun extra early, the latter mown portion is sure to be too ripe.

A little more harrowing and rolling after the sowing of the grain-crop would do no harm: the land does not *tread* kindly, in which case the grass-seed does not *take* kindly, and this may account for the frequent failure of the clover plant here in places where the timothy is abundant.

The implements are all of the best description; good roomy Scotch-carts equal to 15 cwts of dung per load; iron swing ploughs, and iron harrows, &c. One thing I was surprised to see: a Norwegian harrow, a rare tool anywhere, and one which in a stony soil like this cannot be of much use. I remember well its being first exhibited at the Royal Agricultural Society's exhibition at Shrewsbury. in 1845, Mr. Frere, the exhibitor, having just imported a specimen from Norway. The acting part of this implement consists of a frame containing four horizontal spindles, on each of which is fixed a set of teeth projecting from them like the rowels of a spur. These teeth revolve with the spindles, those on one spindle interworking with the others, so that they severally clear and clean each other. Upon inquiry, I found that, owing to the accidental breaking of one of the parts, this tool, which was bought at Mr. Andrew Allan's sale at Ardgowan, had never been used on Messrs. Dawes' farm. The only specimen I ever saw at work was one belonging to Archdeacon Phillpotts, in Cornwall. He spoke very highly of it, and used it constantly in the preparation of land for roots. It would be no good to try this harrow without a powerful team of at least three horses yoked abreast. I was very glad to see the teams at works on the stubbles immediatly after harvest, though I utterly disagree with Mr. Tuck's system of autumn-cleaning. He begins with the plough, inters the couch and other root-weeds, then uses the grubber, and then gives another and a deeper furrow, laying up the land for the winter. Now, this I hold to be a great mistake. Why cut the roots of the couch in pieces, to begin with, and why bury them afterwards? With such heavy horses as are employed on these farms, no grubber or scarifier can be too powerful, not even that cumbersome, though most effective tool, the Ducie Drag. The plough, again, is much too slow in its work. A good scarifier that will skim off the upper inch or two, like Bentall's broadshare, or Coleman's drag-harrow. followed by a duck's-foot harrow, would do the job in one-fourth of the time, and much more effectually. My own plan used to be to use Coleman's implement, with the broadshare tines on, first, and then, substituting the points, to cross the former work. To make a finish to the work, pass the common harrows and the roller over the piece—roller first of course—gather the root-weeds with the horse-rake, and burn them, or make bottoms of dung heaps with them—with our scorching sun there will not be much danger of the couch coming to life again if the operations are begun immediately after

harvest: in the English autumn nothing but burning will ensure their destruction.

Escutcheons.—Did I mention that Professor Brown and Dr. Hoskins agreed with me in my opinion that the theory of the milking qualities of a cow being indicated by the arrangement of a certain portion of the hair between the thighs is rubbish? Dr. Hoskins told me that the American Jersey Association had erased all marks for the escutcheon from their list of points given as a guide to the judges.

I see that Mr. Edward Burnett, a dealer in Jerseys, states in the *Country Gentleman* that he has bought for his patrons more than $50,000 worth of cows, and that he has never been once guided in his selection by the escutcheon. "Neither I," adds he, "nor any one else can understand it." It is high time this absurdity was exploded. I have never met with *one* practical farmer who believed in it.

Ranche losses.—I made a slight mistake in the January number in speaking of the Cochran Ranche losses. Since I wrote, I have seen Dr. McEachran again, and he tells me that the acclimatised cattle have done well enough, but that the *Pilgrims*, by which I understand the Montana and other States' cattle brought into the N. W. Territory, suffered to the extent of 20 %, and, which is far more important, out of three thousand calves born on the ranche, there were only fifteen hundred that survived. And yet the *Montreal Star*, in a recent issue, speaks of the great success which the ranches have met with this season!

Curtis on sheep—Mr. F. D. Curtis, a constant correspondent of the *Country Gentleman*, esteems it a blessing "when the snow spreads its mantle over the frost-bitten grass. After the grass has been frozen and turned brown it has lost its value as food, and any kind stock will rapidly grow poor if compelled to live upon it. I found this out years ago. A flock of sheep were brought up and divided. A portion of them were put into stables and fed for fattening, and the others, in good condition were turned out to graze in the fields. The snow was a long time coming that year, and as the store sheep looked full every day, I thought they were doing well, and so much fodder was saved. When winter came and they were put up, I am sure they had run down one-half in weight. It must have been a steady and rapid decline from the time the grass was stricken with frost."

A most remarkable statement, this of Mr. Curtis, and worthy of looking into as a curiosity of farm-writing. In the first place, I should like to know what kind of a shepherd Mr. Curtis keeps: does he never handle a sheep to see how it is doing? A sheep may look full enough to the eye and yet be doing badly. A good shepherd would pass his hand over a sheep here and there at least every other day, and this without disturbing their repose, as sheep well looked after are very tame creatures. Besides, the mere look of a sheep's eye, and the carriage of its head will always tell of its thriving or not to an accustomed inspector. If in my flock-master days, I had found that my man had allowed my sheep to "run down one-half in weight," I should have set that man to keep the birds off the grain, or to something more suited to his capacity than taking care of a flock of sheep. Would Mr. Curtis allow the frost-bitten grass to go to waste? Did he never hear of such a thing as supplying the defects of an inferior food by a small quantity of richer food? A few pease or oats, say, half a pint a day, a head, with a pound or so if pease-straw or clover cut into chaff, would have corrected the quality of the grass, and enabled the sheep to utilise the whole of it.

Are we to waste all the grass that may remain in our pastures after the first frosts? By no means; but let us use it with discretion. I do not advise its consumption by cows, seeing that it often scours them, but sheep can eat it with impunity, and, aided by other, food it will be an economy to give it them.

It is owing to such ill-considered statements as these of Mr. Curtis, that farmers have such an aversion to and contempt for *book-farming*.

Cow-feeding in 1811.—Messrs. Rhodes and Laycock were the chief purveyors of milk to the Londoners in or about the year 1811. The cows kept were of the Holdernesse breed—the original shorthorns—At 3 A. M. each cow had half a bushel of grains; at four they were milked; a bushel of turnips was then given to each cow, and very soon afterward, they had some soft green grassy hay—56 lbs. between ten cows.—At 12, noon, they had more grains, and at 3 P. M. they had more turnips, followed by hay. This mode of feeding was continued during the turnip season, from September to May. During the summer the cows were fed on grains, cabbages, tares, and rowen, or after-grass hay. When they were turned out to grass, they were kept in the pasture all night, but even then they were fed with grains. Mr. Laycock, who kept about 600 cows, some of which cost him the, then, enormous price of £25 each, used to *store up in pits* as much as 80,000 *bushels of grains in one season!* The average yield of his cows was nine quarts a day throughout the year equal to about 350 lbs. of butter! This, I fancy, is about the earliest known practice of the system of ensilage. Talking of cows, there is a curious legend at Islington of a cowkeeper named Pullen, who was continually trying to get together one thousand cows, but that one always died, keeping his number down to nine hundred and ninety-nine!

Milch-cows at Quebec.—In looking over the list of prizes awarded at the provincial exhibition held this autumn at Quebec, I was struck with the discrepancy between the official list and the list printed in the daily papers. The official list, sent me in the French language, runs as follows:

MILCH-COWS.

1st prize, W. A. Reburn, Ste. Anne de Bellevue; 2nd prize, Thos. Brown, Petite Côte, Montreal; 3rd prize, James Drummond, *ex æquo*, Petite Côte, Montreal; 3rd prize, Elzéar Marcotte, *ex æquo*, Portneuf, Quebec.

By this it will be seen that Messrs. Drummond and Elzéar Marcotte divided the third prize. Referring the matter to Mr. James Cheesman, the judge of the Milch-cow competition, and explaining my doubt of the correctness of the official list, I received the following reply:

Drawer 2678, Toronto—Nov. 15th, 1887.

Dear Jenner Fust,—Your impression was quite correct. Only three prizes were awarded: 1st, Reburn; 2nd, Brown; 3rd, Drummond.

With kind regards,

JAMES CHEESMAN.

In my translation, in the Journal for December, I took the liberty of diverging from the French original by giving: James Drummond, 3rd prize; Elzéar Marcotte, 4th prize; thinking that perhaps the phrase *ex æquo* would not be understood. I do not think our Scotch friends would grudge a prize to a French-Canadian, but it is just as well that errors of this kind should be corrected, as if they are once allowed to go free, there is no knowing how far they may extend.

The Journal.—I do not know whether I ought to mention

the following fact, which only came to my ears yesterday, or not: Mr. Tuck, Messrs. Dawes' farm-bailiff, who has been actively engaged in agricultural operations at Lachine for the last sixteen years, had never heard that there was such a publication as *The Illustrated Journal of Agriculture*.

Lawes on Manures for the Turnip.

Judging from the analysis of the turnip, the specific manure for this crop should be an alkali of some sort rather than phosphoric acid for the root and top contain a proportion of alkalies to phosphoric acid of five to one. Is it so in common practice? By no means, and here is another case in which practice devanced theory. The striking influence of all kinds of phosphates on the swede or the turnip was well known to farmers long before Baron von Liebig wrote on the subject. It is true that, in many parts of England, wood-ashes were used for catch-crops of turnips, but the produce from the ashes was really due to the phosphoric acid contained by all incinerated wood, particularly beech, rather than to their potash. I myself have shown that lixiviated ashes produce quite as many tons of turnips to the acre as ashes undeprived of their potash, but this series of experiments was tried on land which had been regularly manured with dung for many previous rotations, and where, therefore there was present an abundance of potash.

Still, as Professor Liebig, in his Letters on Agriculture, persisted that the Rothamsted experiments were wrongly conducted, and that the deductions drawn from them were erroneous in the highest degree, Lawes and Gilbert were induced to repeat the experiments on a larger scale, with a view to the refutation of Liebig's assertion that: "It is certain that this incessant removal of the phosphates (by the sale of flour, cattle, &c.) must tend to exhaust the land and diminish its capability of producing grain. The fields of Great Britain are in a state of progressive exhaustion from this cause, as is proved by the rapid extension of the cultivation of turnips and mangels, plants which contain the least amount of the phosphates, *and therefore require the smallest quantity for their development.*" And, as a commencement of the proof that the professor was as utterly mistaken in his theory of *the* manure for turnips as we have seen he was in his theory of *the* manure for wheat, let us look at the following table, in which is given the amounts of bulb grown on the experimental plots at Rothamsted from 1843 to 1850, both years inclusive. They are divided into:

First, the continuously unmanured plot;

Secondly, that with a large amount of superphosphate of lime each year;

Thirdly, that with a very liberal dose of potash, with some soda and magnesia (alkalies), in addition to superphosphate of lime. The superphosphate was entirely free from nitrogen, being made by the action of sulphuric acid on burnt bone-dust.

Years.	Plot continuously unmanured.				Plot with superphosphate alone every year.				Plot with superphosphate and mixed alkalies.			
	Tons.	cwts.	qrs.	lbs.	Tons	cwts.	qrs	lbs	Tons.	cwts	qrs.	lbs.
1843	4	3	3	2	12	3	2	8	11	17	2	0
1844	2	4	1	0	7	14	3	0	5	13	2	0
1845		13	2	14	12	13	3	12	12	12	2	8
1846					1	18	0	0	3	10	1	20
1847					5	11	0	1	5	16	0	0
1848					10	11	0	8	9	14	2	0
1849					3	15	0	0	3	13	2	8
1850					11	9	0	0	9	7	1	12
Totals.					65	16	1	1	62	5	1	20
Means.					8	4	2	4	7	15	2	20

After three years consecutive growing of the same plant on the same land, the crop became not worth weighing. Eight successive crops of turnips manured with superphosphate of lime alone yielded an average of 8¼ tons of bulb. The addition of a large dose of alkalies—much greater than could be removed by the crop—to the superphosphate had no effect at all on the average yield; for the diminution of the crop by a mean of about half a ton = 1/16 of the whole may be disregarded.

The deduction I should make from the above series of experiments is this: as the value of the swede or the turnip in feeding cattle is due—as I have often insisted in this publication—not alone to the contents of the bulb, as determined by chemical analysis, being converted by the animal into its own flesh, fat, &c., but to some, as yet unknown, special agency which they exert in developing the assimilative processes of the animal; so, I believe the effect of the phosphoric acid on the swede or turnip is due to some special agency which develops the assimilative processes of the plant. And this is the more likely, because in the case where the superphosphate is immediately neutralised by the large dose of alkalies, we see that the efficacy of the manure is thereby reduced. And again, the effects of the phopshoric acid, as such, cannot be due merely to the liberation of the alkalies of of the soil; for in that case we should expect that the artificial dose of these would at least have increased the crop.

Hence, we must conclude that phosphoric acid, though it forms so small a proportion of the ash of the turnip, has a very striking effect upon its growth, when applied as manure; and it is equally certain that the extended cultivation of root-crops in Great Britain cannot be due to the deficiency of this substance for the growth of grain and to the less dependence upon it of the root-crops, as supposed by Liebig.

And what, now, are the conclusions we draw from what we have seen of the effects of nitrogen as a manure for wheat, and of phosphoric acid as a manure for swedes and turnips? First, that, taking into careful consideration the tendency of all experience in practical farming, as well as the collective results of the Rothamsted investigations, it is pretty certain that the analysis of a crop that is sold off a farm affords no direct guide to the nature of the manure required to be provided for its increased growth from sources extraneous to the home manures of the farm, that is to say, artificial manures; or, in other words, if land is well and regularly farmed, nitrogen for the grain-crops, and phosphoric acid for the root-crops, will be the only imported plant-food required. (1)

Silage experiments at Woburn.

(Continued from p. 186, vol. IX.)

In the trials between *sweet* and *sour* silage, Dr. Voelcker does not seem to have reached any definite conclusion; whether this failure was due to bad management of the harvesting, or to some other cause connected with, perhaps, the quality or the over-ripeness of the grass, I cannot say positively, but my impression is that as the content of the silo No. 2, which was the one intended for *sweet* silage, never attained a

(1) The use of nitrogenous manures for mangels, even where the dressings of farmyard dung are superabundant, is, and always been, a puzzle to me as far as regards the theoretical reasons for their adoption. As to their practical use, I have no hesitation in saying that any farmer who sows mangels without adding to the ordinary coat of dung a supply of at least 30 pounds of nitrogen, either in the form of nitrate of soda, sulphate of ammonia, or guano, is throwing away at least eight tons of his potential crop.—A. R. J. F.

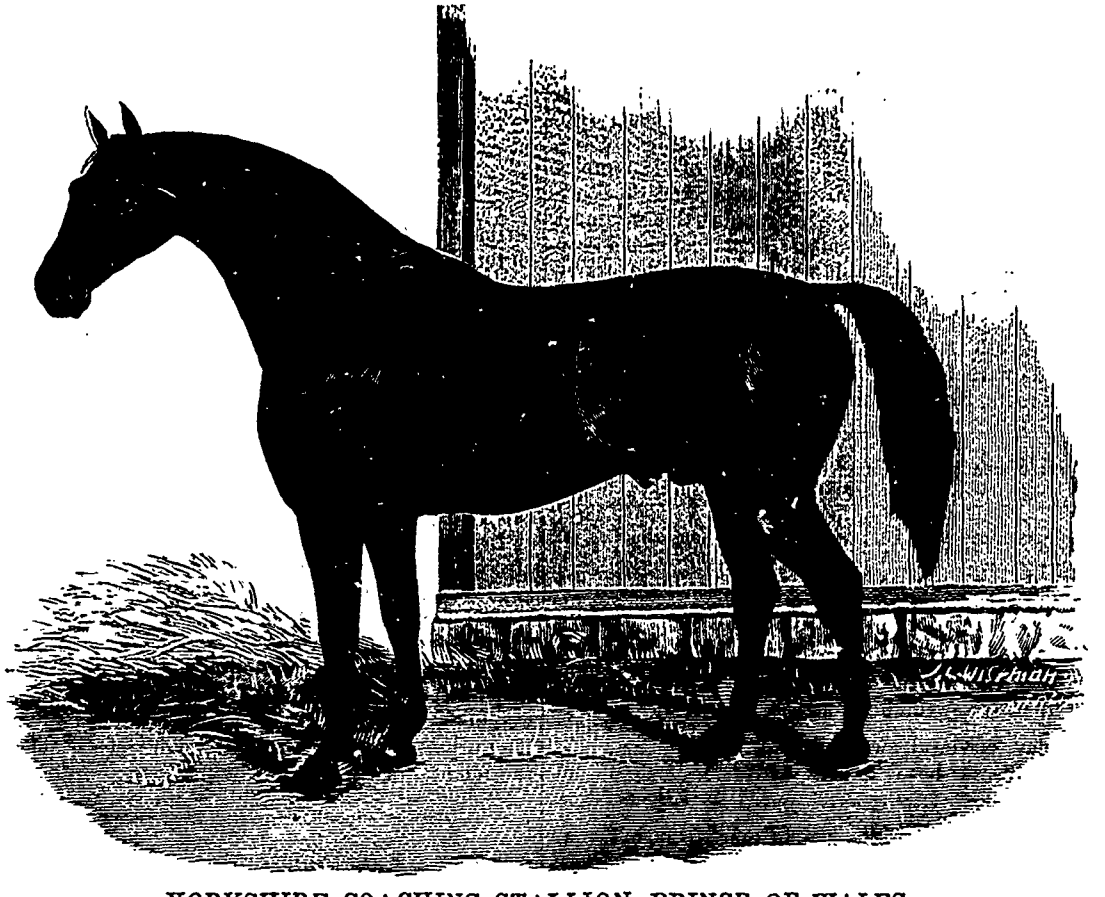
temperature of more 90° F., and as there was nothing like uniformity among the samples taken from the same silo, we need not trouble ourselves about this part of the series, except to observe that as a material for weighting, sand spread on matting was not found to be so good as stones in boxes resting on boards; as whenever the silage settled unevenly, the sand had a great tendency to fall together, and leave parts of the silage less protected from the entrance of the air.

Second year's experiments, 1885-86—The experiments this year were confined to grass; that selected for the purpose was of good quality: the usual Bedfordshire meadow-grass, from land that had been down for centuries. Two silos were employed—Nos. 1 and 4—the intention being to fill the former with sweet and the latter with sour ensilage. The year: greater care required in filling the sweet silage pit, and longer time required to allow heating to take place; removal of boarded doorways, which were now bricked up.

The following series of feeding experiments were carried out:

1. Silo 4:—Sour silage vs. roots and hay-chaff.
2. " 1:—Sweet " " " " "
3. " 3: (filled in 1884)—Oat-silage vs. roots and hay-chaff.
4. " 3:—Oat-silage vs. hay.

For these trials sixteen 3-year-old Herefords were bought; all from one herd. This breed has always proved much kindlier and more regular feeders than shorthorns; at least, so says Dr. Voelcker.



YORKSHIRE COACHING STALLION, PRINCE OF WALES.

meadow was divided into three parts: two parts for silage, and the third for hay.

The grass was cut July 4th: 10¾ tons put at once into No. 4, and weighted at once; 14½ cwts. into No. 1; 7¼ tons made into hay, which was stacked on July 6th, weighing 2½ tons.

July 7th, 1¾ tons were added to No. 1; July 10th, 4½ tons were added to No. 4, and weighted at once; same day ⅛ tons added to No. 1, which was weighted on the 16th.

	tons.	cwts.	qrs.	lbs.
Thus No. 1 had of sweet silage.....	3	13	0	13
No. 2 " " "	15	3	0	16
Hay.....	2	11	0	21

Both silos were opened and the haystack cut December 18th.

Several points had been observed during the previous

The first experiment of this series was on No. 1, sour silage vs. roots and hay-chaff.

The temperature of this never exceeded 95° F. Of the original weight, viz. 15 tons, 3 cwt., 0 qrs., 16 lbs., were lost by evaporation, fermentation, &c., 16 cwts., 2 qrs., 8 lbs.—about 5.5 per cent.

The weights of the 4 bullocks put on silage = 42 cwts., 2 qrs., 4 lbs.

The weights of those put on roots and hay-chaff = 42 cwts., 0 qrs., 12 lbs.

The allowance of food at first was:

Silage-fed bullocks, per day—50 lbs. silage, 3 lbs. decorticated cotton-cake, 5 lbs. maize-meal.

Root-fed bullocks, per day—45 lbs. swedes, 3 lbs. decorticated cotton-cake, 5 lbs. maize-meal.

The quantities of roots and hay, of cake and corn, were adhered to throughout, the silage being given *ad libitum*,

though weighed. The average amount of silage eaten was 50 lbs. per head. As in the previous experiments, the silage bullocks drank twice as much water as the root-fed ones.

The bullocks did well from the beginning to the end of the trials, and the final result was, as follows:

	lbs.oz.
Daily gains per head with silage during 113 days.....	2 1
Daily gains per head with roots and hay-chaff 113 days.	2 5
Daily gain in favour of roots and hay-chaff 4 oz. per head.	

Thus, we see that bullocks fed on sour silage made from grass of good quality will fatten well, though not so well as roots and hay-chaff.

Second experiment.—Sweet silage vs. roots and hay-chaff. The silo No. 1 was used: sweet silage from grass cut from the same meadow as No. 4. Heated up to 135° F. in three days; on July 16th, when weighted, temperature equalled 154° F.; when opened, December 18th, the silage was very hot (130° F.) and steaming. Near the bottom, the material was quite dry, and very like hay in appearance. The smell was sweet, quite distinct from the smell of the sour silage, and the proof of *sweet* silage having been made is that out of six samples analysed, four contained no acetic acid at all, and the other two the least trace—0.3 per cent. But against this we must oppose the fact that the sweet silage kept badly and soon became mouldy, so that much of it was wasted. The loss by evaporation, fermentation, &c., was 12.66 per cent, against 5.5 in the case of the sour silage = 130 per cent. more, which is a difference worth remarking.

Two bullocks were fed on sweet silage, cake and corn, and two others on roots, hay-chaff and cake and corn, as below:

RECEIVING SILAGE.	lbs.	RECEIVING ROOTS AND HAY.	lbs.
Decorticated cotton-cake.....	3	Decorticated cotton-cake..	3
Maize-meal	5	Maize-meal	5
Sweet silage—average.....	42½	Swedes—average	45
Water	53½	Hay-chaff	10
		Water	22½

Observe that the sweet silage bullocks drank 120 per cent more water than the swede bullocks.

Gain, per day, per head, sweet silage... 1 lb. 7 oz
Gain, per day, per head, swedes and hay chaff..... 1 lb. 12½ oz. 5½ oz.

So, there was a gain, as in the case of sour silage, in favour of roots and hay-chaff; and, it would appear from the two series that there is not much to choose between sweet and sour silage, but considering the convenience of filling the silo at once, as can be done with the sour silage, and the large loss by evaporation, fermentation, &c.—which loss cannot be all water, as some would try to persuade us—I confess I am led to prefer the quick method of filling. For, if it takes from August 27th to October 4th to fill a silo with sweet silage, (1) or anything like that time, unless the ensilage crops are sown in succession, it seems probable that either the first fillings must be too green or the last fillings too ripe, to say nothing of the continual botheration of interrupting the routine of farm-work to take off a team of horses from grubber, harrows, or plough, to carry two or three loads of fodder-corn from field to silo.

Oat-silage.—The third experiment—18 tons, 13 cwts. of oats, cut green, chaffed, and weighted at once with 6 tons of stones in boxes, resting or boards—on oats vs. roots and hay-chaff, began on December 18th 1885, the silo having been filled in July 1884. A very considerable amount of waste by the *boarded* doorway, extending 18 inches inwards; 6 inches from surface sodden, and by the sides 2 to 3 inches; the rest very good, with a pleasant aromatic smell, and, even when freely exposed to the air keeping sweet for a long time. In July '86 there was a lot of it left, still perfectly free from mould, which had been exposed since April. The silage was decidedly acid.

Loss by fermentation, evaporation, &c., 15.05 per cent.; on the whole of the 18 tons, 13 cwts., 2 tons, 14 cwts., 2 qrs, 15 lbs., had disappeared.

Oat-silage bullocks	lbs.	Roots and straw-chaff bullocks.	lbs.
Silage	52	Roots.....	45
Decorticated cotton-cake.....	3	Decorticated cotton-cake ..	3
Maize-meal	5	Maize-meal.....	5
Water	28½	Straw-chaff...	9½
		Water	13½

Gain per head, daily, oat silage..... 2 lbs.
Gain per head, daily, roots and straw-chaff. 1⅓ "

This seems to have been the most satisfactory series of experiments: two changes of form having been carried on, and all tending to show the high feeding properties of oat-silage; at the same time, it has yet to be shown whether ensiling oats in an unripe state is more profitable than harvesting them in the usual way.

Useful as these inquiries are, we have not yet got what I should like to see: a thorough comparison between the product of an acre of corn cut when ripe, the grain extracted, and the fodder chaffed, and the same quantity of corn cut in the usual state in which fodder corn is given to cattle, ensiled, and fed out in the ordinary way. Ensiling *ripe* corn can hardly be an economical way of treating it.

Lastly, the question is solved which has, to my mind, always been an important one. Does sound hearty food, like swede turnips, produce a greater or less proportion of dead-weight per carcase when compared with, what I must be allowed to call a *washy* food, ensilage: As for example, the following table of live and dead-weights of 8 of the bullocks under the experiments we have been considering. The dead-weights were taken in the market by an official appointed for the purpose, and represent the weights of saleable meat after the removal of the offal.

Bullocks.	Food.	Live-weight.	Official dead-weight	
		lbs.	lbs	
1	Silage	1351	743	Total of silo fed
2	"	1379	781	Dead-weight.
3	"	1553	806	Live-weight.
4	"	1398	764	5681 vs 3176
5	Roots and hay	1408	849	Total of root-fed.
6	"	1261	768	Dead-weight.
7	"	1543	880	Live-weight.
8	"	1463	841	5670—3338

Thus, the difference of dead- to live-weight is 164 lbs. in favour of the roots and hay chaff bullocks, equal, at present prices in England, to about 25 shillings a head, which sum would pay for at least 25 day's keep out of the 114 days they were fattening.

In my feeding experience, bullocks drank nothing at all, as the water contained in the bushel of roots, together with the water imbibed by the two pounds of linseed, the six pounds of meal, and the bushel of chaff, seemed to completely satisfy

(1) See Journal for March, 1887, p. 46.

their demands for moisture. In fact, from the time they went into their boxes till they came out fat, generally 16 or 17 weeks, the beasts never saw water.

ARTHUR R. JENNER FUST.

OUR ENGRAVINGS.

Judges at the County Shows.

It is a frequent remark that certain so-called enemies of Agricultural Societies assert that many of these associations do not fulfil the duties of their position. Without going so far as this, we must, nevertheless, confess that in our opinion, some of them are far from perfect. The reason that influences us in making this statement is, that very lately we conversed on the subject with a member of the Council of Agriculture who like ourselves, is in the habit of frequently visiting the County Exhibitions. There is not the slightest doubt that the reason why several of these associations have so few members is, that they have allowed many of their former subscribers to be so unfairly dealt with by the incompetent judges appointed at the annual shows, that the exhibitors have withdrawn their names in disgust.

We can name many occasions on which such facts as these have been clearly demonstrated; facts that both we and the member of the Council of Agriculture of whom we have just spoken, are able to prove.

We saw, at one show, the judges give a first prize to a stallion of such an inferior stamp, that he would not have been worth much had he been a gelding.

We saw, at another exhibition, brood-mares awarded prizes, though their foals were so inferior that the very same judges set them on one side, as utterly unworthy of any prize, when, at the same time, the rules of the society required (and wisely) that the dam *with* her foal should be exhibited. We, ourselves, selected for exhibition a cow from our herd, for her size alone, neglecting entirely her milking points, leaving out our best milkers, on account of their smaller size, because we knew that large-framed cows would be preferred to those of less size, though the latter might be better milkers; two of our neighbours did the same thing, and we were awarded first, second and third prizes for the best milch cows! But what is this compared with the fact that the judges gave a prize to a *stallion* that was not a stallion at all?

And moreover, what justice can be expected from judges chosen out of the same county in which the exhibition is held; called upon to judge the animals of their friends, accompanied sometimes—as we have seen ourselves this autumn—by a guide to give them full information about the animals, he, the guide, having himself animals in the same classes.

What shall we say of a Director who instructed the judges of brood-mares to judge the mares without troubling themselves about their foals? We give no names; we do not mean to say that even such facts as we have quoted necessarily lead to the conclusion that the county shows are of no use. But what we do mean is, that these societies really must take steps to avoid such gross blunders as these we have mentioned—and we could bring forward many more of the same type—for it is such monstrous errors as these that make the Agricultural Societies so unpopular in certain quarters, and we cannot deny that there are good reasons why they should be so regarded.

(*From the French.*) J. C. CHAPAIS.

Quite right, M. Chapais; the judging in this province, not only at the county shows, is disgraceful. I remember, even at Mile End, some very curious decisions. Should the owners of animals be allowed to lead their own beasts into the ring? I think not, neither should the steward allow the judges to look into his book to see to whom any particular animal belongs.

As to judging milch-cows, it is a difficult point; even at the great dairy-shows at Islington, England, the first prize milch-cow is very often not the one who, in the final contest for the cow that yields the most and best milk, is the conqueror. I remember, some dozen years ago, being judge of cattle at an Eastern Townships show. When I and my brother judges came to the milch-cow classes, the other two judges, violently smitten with her external beef-making beauties, wished to award the prize to a coarse-bred shorthorn without a milking point about her, when alongside of her stood as useful a specimen of a grade-shorthorn dairy-man's cow as ever I saw. It took ten minutes argument before I could get my way, but I got it at last. The best of the joke was that both cows belonged to the same farmer and he was terribly put out at the decision, as his pet cow was put after a grade, the shorthorn cow being only a cross-bred after all, and not eligible to the herd-book.

AUTUMN PLANTING.

Since our return to Three-Rivers, after an absence of twenty-two years, we have seen proved to our satisfaction the successfull issue of the planting of thousands of trees under the superintendence of M. Louis Warnecke, guardian of the parks, &c., of this city. M. Warnecke invariably plants deciduous trees in the autumn, but he plants early in that season, in order that the roots of the trees may be firmly fixed in the ground before the frost. Of course, if the land is of tenacious quality, the trees should be planted on raised hillocks, rather than in sunken holes, so that the rain-water may get away by means of water-furrows left for that purpose.

The reason assigned for the autumn planting of deciduous trees by M. Warnecke is, that the sap begins to flow long before the snow goes, and the tree at that time is full of life. If planted in good health, and in well prepared ground, the subject in its new abode is ready to take advantage of the sap-flow, and spring at once into new life. Fruit-trees, too, should be planted in autumn, according to M. Warnecke, that is, provided they are set out during the last week of September or the first week of October.

The opinion of so noted a specialist ought to be made known to all our readers.

(*From the French.*) ED. A. BARNARD.

It seems that this last year, the *Fête des arbres* was fixed by proclamation for the 27th October, a day on which, according to M. J. C. Chapais: "In the eastern part of the province, below Quebec, the *fête* could not possibly be observed, for the ground was frozen three inches deep, and covered by two inches of snow." M. Chapais is decidedly opposed to planting in autumn, and gives his reasons. Does the question not sum itself up in this: If the planting is done early and in well prepared land, the autumn-planted trees will most probably gain a good start of those that are set out in spring? But here arises another point: can we be sure of getting trees for planting by the time we want to go to work? Yes, if we grow them ourselves; certainly not if we depend upon nurserymen.—A. R. J. F.

I. TARTE, Esq.,

Member of the Council of Agriculture.

Dear Sir,—We were talking, yesterday, of the choice of the autumn season that had been made this year for the celebration of the *fête des arbres*, and I gave you my reasons for preferring the spring. As you seemed to think that my observations were worth publishing, I address myself to you for that purpose.

Here in Canada, we have little practical knowledge of the art of forestry, which, brought to perfection in France and Germany, cannot be adopted here without great modifications (rendered necessary by climatic differences) which experience alone can teach us. My experience I offer for what it is worth: others may learn a lesson from my mistakes, as I have done myself.

At the commencement of my cultivation of forest-trees, I chose the autumn in preference to the spring, *because in the former season I had more time at my disposal;* I used to plant a little in spring, but chiefly in autumn. It is only after several years' experience that I have given up autumn-planting, and for the following reasons.

In October, 1882, I had set out about a thousand young Black-walnuts, sown, in a nursery-bed, the preceding autumn.

The work was carefully done, each little tree was planted by my own hands, in good fresh earth, placed in holes prepared beforehand.

Nine-tenths of the trees, when spring arrived, were stretched out on the surface of the ground, as if they had been torn out by hand, and the rest were hardly better off, for all, with very few exceptions, had the bark stripped from their roots: it was split up nearly the whole length, mildewed and quite loosened from the wood. They were dead; we know that a tree cannot survive the loss of its bark, when it is stripped all round the trunk, though ever so slight a width; roots are still more delicate, and die immediately after losing their bark.

It is thus I explain the loss of these trees: the autumn rains had penetrated the newly moved porous ground to a considerable depth, and had saturated it with water; the spongy roots of the newly planted trees, had also imbibed water freely.

Hard frosts succeeded, the moisture enclosed in the roots expanded, and bursting the bark, raised the loose earth about the trees and threw them out of the ground.

Into what sort of land did you transplant these trees? you will ask me.

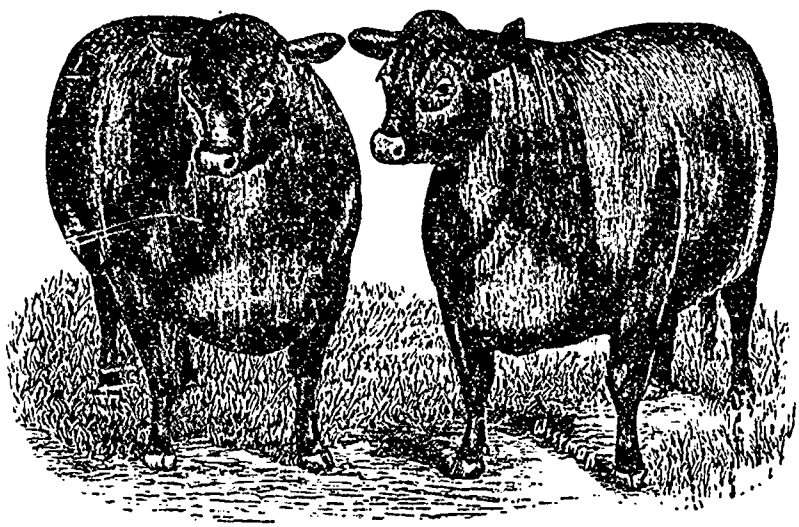
Into heavy land. If it had been sand, or light land, *not retentive of water*, the trouble would not have happened, whence I came to the conclusion that autumn planting should not be practised in land of strong quality and retentive of moisture.

Since that time, I have planted trees of the same sort, and in the same soil, in spring, more successfully. The soil has plenty of time to become firm during the summer, and when autumn comes, it no longer absorbs the rain with same facility that it did when newly moved, especially if care is taken to have a gentle slope to remove the water from the foot of the trees.

I would advise all those who intend to plant this autumn to avoid strong retentive soils; but, on the other hand, if the soil is too light, the plants, though they may get over the winter, will run the risk of suffering from drought next summer, if they belong to those species which demand a certain degree of moisture, as all deciduous trees do.

To sum up, autumn planting is *dangerous* as regards our rigorous winter, while spring-planting is *inconvenient* on account of the short time which, in the midst of our other work, we can devote to it: it is better to plant one tree well, and save it, than to plant ten trees and lose them all.

In sowing tree-seed—decidedly the best way of growing them—I have always found it best to sow in autumn, and as far as this goes, the appointment of that season for the holding of the *fête des arbres* is perfectly suitable, provided always, that the nuts, acorns, &c, are got ready in time. Naturally, the end of June is the proper time to sow elm and plane, as the seeds of those trees fall about that season.



REMARKABLY EXCELLENT ABERDEEN-ANGUS STEERS.

Too much care cannot be taken to preserve the roots intact when setting out trees. M. Wm. McGibbon, the manager of the Montreal Park, whose knowledge of the subject nobody will dispute, does not seek to keep the roots long, or to have an abundance of them, but he prunes them carefully, cutting out every damaged bit. He uses a very sharp knife, to prevent tearing the bark, and always makes the cut on the under part of the root, that the rootlets which spring rapidly all round the wound may bury themselves at once in the ground, and bring up from the lower couches of the soil moisture and nutriment for the support of the life of the tree.

At the expiration of one year from planting, I have compared tree-roots which have been carefully pruned with others which have been left torn and bruised. The former had a circle of fine young rootlets radiating all round from the mother-root, and bearing to her from every direction the nutritious juices she in her turn carried to the tree; the others were nothing but torn and broken sticks, presenting no signs of having, from the date of their transplantation, made any effort at reproduction; or else, they showed a few little shapeless radicles, the last efforts of a moribund tree.

But I am growing sentimental, it is time to stop.

Believe me, my dear Sir, entirely yours,

H. G. JOLY.

(*From the French.*)

Georgeville, P. Q., 28th December 1887.

ARTHUR R. JENNER FUST, ESQ.,
Box 109, Lachine, P. Q.

Dear Sir,—Since addressing you on the subject of Fertilizers I have received two tons of Bone Meal from Messrs. Mark Finch & Co., London, Eng.

The cost was as follows:

Cost per ton of 2240 lbs., in London, F. O. B., £5, 12s, 6p	$27.50
Ocean Freight to Montreal per ton	4 80
Duty 20 %	5.50
Per ton of 2240 lbs	$37.80

Equal to $33.75 for Canadian ton of 2000 lbs.; add freight to Georgeville $3.60 per 2000 lbs.; $37.35 or $1.87 per 100 lbs.

The dressing you suggest for an acre would come to:

450 pounds Bone Meal at $1.87	$ 8.42
20 bushels ashes (can be had here in limited quantities at 15c. per bushel).	3.00
Per acre	$11.42

The "Standard Chemical Co." Smith's Falls, Ont, supply a brand of manure containing Ammonia 2½ to 3½ %; Phosphoric acid 9 to 11 %, and Potash (actual) 2 to 2½ % for $1.75 per 100 lbs.; adding 18c. per 100 lbs. freight to Georgeville, the cost per 100 lbs. is $1.93.

They recommend a dressing of 600 lbs. per acre for grain, &c.

This makes the cost per acre $11.58—only a few cents more than mine costs me. Please say how the relative manurial values of the two lots compare (I have a price list from Messrs. Thos. Jickers & sons, Manchester, England, who offer to supply a manure F. O. B. at Liverpool for £5, 11s, 3p, per ton, containing 12 % phosphoric acid (soluble) and 6 % ammonia (no potash, as they consider this could be supplied cheaper from ashes here.)

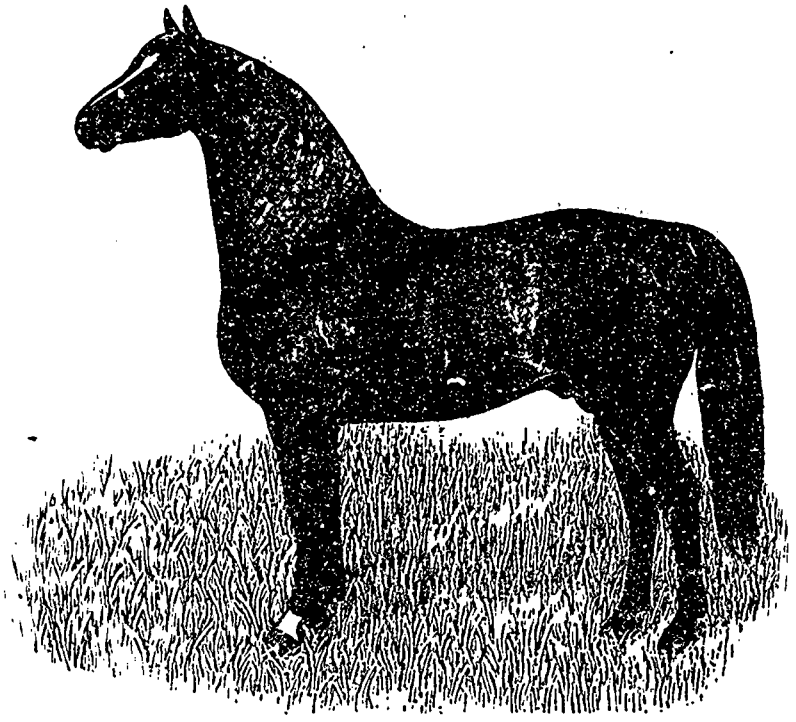
Would you kindly say how long before sowing I should mix the ashes and bone dust as I have no idea what time it will take to heat up to 150 degrees. Will it be a good dressing for mangolds and wheat or shall I have to add sulphate of ammonia?

Yours respectfully,

BICKFORD WEST.

I wrote privately to Mr. West in reply to his letter. The ashes I recommend for mixing with the bone-*dust* are unnecessary when fine bone-*meal* is used. On such soils as Mr. West farms there is probably quite enough potash already, so the 450 lbs. of bone-meal will be enough for the young grass for which I understood him to be seeking for a special manure. Mr. Jickers' manure seems, from the analysis, to be good and reasonable in price. For mangels, dung and 1½ cwts. of sulphate of ammonia; for wheat, if the land is in fair condition 1½ of sulphate of ammonia, harrowed in with the seed, ought to bring a good crop.

A. R. J. F.



IMPORTED FRENCH COACH STALLION FUYARD.

Two Remarkable Polled Steers.

Our picture (specially engraved for the *Country Gentleman* from a lithographed plate of larger size) represents two Aberdeen-Angus steers, half brothers, each being a son of Guido 2135. The one at the reader's left, Pontiff, is out of Pride 9th of Graystone 5947, and was born Feb. 10, 1885; the other Black Prince of Turlington 2d, is out of Duchess 11th of Shempstone 6333, and was born Nov. 29, 1884. They took first and second prizes in their class at both the Chicago and the Kansas City Fat Stock Shows, both last year and this year—certainly a remarkable record. When 1002 days old, Pontiff weighed 1800 lbs., being 1.80 lb. per day; when 1075 days old, Black Prince weighed 1995 lbs., being 1.86 lb. per day. Both animals were killed after the Chicago show. We did not see the carcasses, but observe that they are very highly commended by the Breeder's Gazette, especially Black Prince, who presented "certainly one of the finest specimens of superlative marbling ever seen on the block at these shows," and came very near getting the prize in his class, one of the two judges preferring him to the half bred Galloway in whose favor the umpire finally decided.

Pontiff and Black Prince were bred, fed and shown by Mr. T. W. Harvey, Turlington, Neb.

Yorkshire Bay Coach-horse Prince of Wales.

A pretty full history of the Cleveland-bay breed of horses appeared in the *Rural* of October 1st. The Yorkshire-bay breed is substantially the same. The Cleveland Bay originated in the mining district of Cleveland in the North Riding of Yorkshire, from a cross of Thoroughbred or high-blood stallions on the heavy draft horses of the district, the result being a lighter, livelier, more spirited animal, suited for coaching purposes. When the railroad superseded the coaches at the beginning of the century, the Cleveland-bays were allowed to die out wholly, or almost so. The revival of coach-

ing for pleasure of late years, and the great demand for fine, large carriage horses, as well as sprightly animals for heavy express work, having created a good market for horses of the old Cleveland-bay type, the breed has been either resuscitated from some of the old stock still here and there in existence, or created as was the old breed by the mingling of Thoroughbred blood with that of the large bay mares of Yorkshire. The new Cleveland-bay Society in England got up a Stud Book some time ago, and the American Cleveland-bay Society is getting up one now; but the new Yorkshire-bay Coach-Horse Society has lately come into the field as a rival of the older body. It, too, has just got out a "Stud Book of Great Brit'n and Ireland, containing pedigrees prior to 1882," but a careful reading of the constitution of the society fails to indicate what rules were adopted for registration, and what, therefore, differences exist between the Cleveland- and Yorkshire-bays, but the impression strongly conveyed is that the difference is about the same as that, a short time ago, supposed to exist between the Holstein and Friesian or the Aberdeen and Angus breeds of cattle, or supposed still to exist between the "Percheron" and "Norman" breeds of horses. The cut, re-engraved from the (London) Live Stock Journal, represents what is said to be a fine specimen of the new breed. He is known as Prince of Wales, "and comes of a good line of Coach horses as well as Thoroughbreds." He is 13 years old, stands 16 hands high, a trifle less than the height of the average Coach-horse; "otherwise he posesses all the style, color and various desirable points." He is most famous as being the sire of several valuable prize winners, and in a breed in process of creation, like the Yorkshire Coach-horse breed at present, power of begetting superior progeny attaches great value and distinction to a bull or stallion. It is this characteristic that has distinguished Hubback and Favorite among the Short horns, as well as the Darley and Godolphin Arabians and other famous early sires among Thoroughbreds.

The accompanying illustration is a portrait of the four-year-old French coach stallion Fuyard, imported by Mr. J. W. Akin, Scipio, N. Y., who writes of him as follows:

"He is 16¾ hands high, weighs 1,500 lbs., and has a long neck well set on, unusually fine head and ears, very round body with long hips, clean wide legs, and has the finest of coach action. Fuyard was bred by one of the oldest breeders of coach stock in France. This particular family of coach horses has been owned by him for forty years, and he has never before sold horses to an American until after the government had made its selection. Fuyard is the largest of any of the coach horses that I have imported, and although largely interested in Percherons for some years, this is my first importation of coachers. Although but recently introduced in this country they are getting to be the most popular coach breed in the east."

SOME MISTAKES.

MR. EDITOR.—The following is part of a paper which I read before a farmers' meeting lately.

"Many farmers do not sufficiently value the fertility of their land. Fertility in a merchantable shape, such as superphosphate or guano has a marketable value, and it is not till those fertilizers have to be resorted to that many are aware of the blunder they have made. That which is not valued is likely to be wasted.

The man commencing on a new and fertile farm is very likely to act as many do when the pocket is full of money. The danger is even greater, because the waste is not so perceptible. The man who is careful of his dollars, and at the same time careless of the productive forces of his farm, makes a mistake. The one is just as important as the other: neither when squandered can be restored, except by drawing on something else. If a man loses his purse, he may replace it by drawing on his land. If he waste the fertility of his farm he may replace it by drawing on his purse. In buying or valuing farm land it should never be lost sight of that it is the fertility that is of value, and not simply quantity measured on the surface. And yet many make the mistake of valuing surface quantity more than depth. It is a mistake to suppose that a farm with double the fertility of another is only worth double the price. It is worth four or five times as much. This mistake leads to bad practice with the MANURE PILE.

This being a thing of great value, it deserves care and attention, just as much as a valuable horse does. Serious losses result from the mistaken idea so many entertain that manure can take care of itself. Having personal experience of the difficulties the ordinary farmer has to contend with, I do not recommend, as is frequently done by agricultural writers, the building of sheds in which to store the manure: the cost is too great. Not one in a thousand will give heed to such advice, but what I do recommend is improvement on the general practice. Instead of having the manure just where it can be easiest thrown or dumped, it should be piled as neatly as in building a stack, and much in the same shape, till it is by the first of May six feet deep, and flat on the top, and in this manure pile there should be a few places slightly hollowed to catch the leakage, which with a long handled dipper can daily, or every few days, as it may collect, be baled back on the top of the pile. The surplus urine which may not be absorbed by the bedding should also be added, and if any part of the pile should become very hot and in danger of fire-fanging, the liquid should be applied more particularly to that part. This plan of caring for manure is easily practised, and I recommend it, not because it is the best, but because it is an improvement so easily adopted that many if made aware of its advantages would be likely to adopt it. It also gives a neat and tidy appearance to stable yards. The next mistake I will notice is the TREATMENT OF PASTURES.

We have all heard the expression: "I might just as well as not have had two or three more cows; my pastures are knee deep." Evidently thinking that all was wasted that was not eaten. This mistake results from ignorance of the laws of nature. We have not yet got a grass, and never shall get one, nor, in fact, any other kind of a plant, that grows for the purpose of being eaten, trod upon, or cut off. The great end of all animated nature is to produce its kind. In order to do this, the plant strikes its roots in the ground and its leaves in the air. If those leaves are taken off, the root stops growing, till an equilibrium is again obtained. If the leaves are again and again taken off, the root becomes sickly, and the plant ruined. Pasture grasses are no exception to this law. It declares that all plants have a top corresponding to the root. An old well cropped pasture is as mellow as an ash heap two inches below the surface, while in fence corners where stock have not had access, it is a stiff sod six inches deep. Turnip beetles, potato bugs, currant worms, caterpillars on apple trees, &c., &c., teach us the same lesson. To be productive, pastures must have a large growth every year, and we must learn to be satisfied with simply the surplus. To take the whole, as many strive to do, is like killing the goose that lays the golden eggs. Many farmers have a distaste for any thing scientific in farming, not knowing that all good farming is scientific. Science in farming is simply working in harmony with the laws of nature. Any thing not in harmony with those laws is a mistake. A prevalent idea is that land becomes rich by being pastured. It is a mistake. Something

cannot come from nothing While milk, beef, wool, horse flesh &c, are being drawn from the soil, the land is becoming poorer Many have been the attempts of mechanics to gain speed without losing power, or power without losing speed, but it was never done, and never will be done. Neither will the attempts of farmers to get something from nothing ever succeed.

F. MALCOLM,
Innerkip, Ontario.

December 12th 1887.

City Milk Standards in their relations to health.

Various regulations have been proposed with a view to prohibiting this or that kind of food, as, for instance, distillery slops, slaughter-house refuse, and other forms of waste. It is often overlooked that the object of feeding such refuse is to increase the flow of milk at the expense of its quality; and especially is this the case where low prices prevail.

There is no easier way of demonstrating the truth of this proposition than by quoting the example of the public milch-cow competitions. Formerly it was the practice to give the prizes to those cows which gave the largest quantity of milk, without the slightest regard to the quantity of total solids, or the proportion of butter-fat contained in the milk, or the distance from calving, or the length of time the cow had been in calf. In such competitions the milk would seldom average above 11 50 or 11 75 per cent. of total solids, of which less than three per cent. was butter fat. The cause was not far to seek, and was invariably found in the mode of feeding, which consisted of rations composed of sloppy food of low nutritive value, supplemented with roots.

In the present day feeders work with very different rations, composed mainly of grains rich in oil and nitrogenous matter, supplemented with just enough coarse fodder and roots to make the whole digestible and profitable. Whereas, under the old system, it took about eleven or eleven and a quarter pounds of such milk to make one of cheese, or about thirty to thirty four to make one of butter, we can get, with modern economic rations, one pound of cheese from six or seven pounds of milk, or one pound of butter from fourteen to twenty-two pounds of milk.

If throughout a working season of six months Ontario creameries can make one pound of butter from twenty-five pounds of milk, and Quebec creameries can produce the same quantity of butter from twenty-two and one-half pounds of milk, surely there is nothing unjust in asking that our city milk supplies should show a higher average per cent of butter fat than they now do. A recent document issued by the Inland Revenue Analyst reports the following as the averages of quality obtained at the places of examination.

PROPORTION OF BUTTER FAT.

	Highest.	*Lowest.*	*Average.*
Halifax	5·40	3·00	4·24
St. John	4 62	3·43	3·91
Quebec	4·18	3 02	3·54
Montreal	5·17	2·80	3·82
Ottawa	5·29	3·62	4 26
Toronto	4·50	3·52	3·38
Total average			3 89

MILK SOLIDS AVERAGE.

Halifax	12 72
St John	12·45
Quebec	12 39
Montreal	12 29
Ottawa	12·93
Toronto	12 08
Total average	12·48

From these data the analyst draws the conclusion that we should not adopt a standard higher than twelve per cent. of total solids, of which 3 5 per cent should be butter fat. Surely if these cheese factories and creameries can obtain milk from grass-fed cows for six months throughout the Provinces of Ontario and Quebec of higher average quality than the city supplies examined by the official analyst, it is only reasonable that we should expect as good milk for city use in summer, and in winter one of slightly improved quality when cows are fed on grain and other nutritious food, and prices are higher.

Before adopting its milk standard of 13 per cent. total solids, of which 3.7 per cent. is butter-fat, the State of Massachusetts investigated milks from a much wider range of territory, with the following results.

AVERAGE COMPOSITION OF MILK (By various authorities)

Authority.	*Solids*	*Fat.*	*Not Fat.*	*Ash.*
Paris Standard, 1887	13 00	4 00	9 00	70
Average of a number of farms near Paris By Adams	13·10	4·10	9 00	·70
Report of Paris (1885) Municipal laboratory. Average of all authorities quoted	13 30	4 00	9 30	70
Babcock Milk Inspector, Boston 1885 Eighty samples as delivered by milkmen	13 30	3 50	9 80	·70
Wurtz (leading French authority) average of a number of analyses	13 60	4 00	9 50	·60
J. Carter Bell, average of 181 cows	13 60	3 70	9 60	·70
New York Dairy Commissioner's report. 1885. Average of 296 cows	13 73	4·21	9 52	·71
New Jersey State Board of Health, average of 85 dairies	13.80	4 22	9·58	·65
Davenport. Average of 18 native cows	13 82	3 84	9 98	·64
Poggiale Average of ten analyses	14 00	4 30	9 70	70
Average of a large number of analyses by Bouchardt	13·30	4 10	9 20	·70
Davenport. Milk Inspector of Boston, 1884, average of 31 grade Ayrshire cows	13 32	3 70	9 62	—
Cameron. Average of 100 cows of the Russell Farm, England	13 40	4 40	9·00	·70
Cameron. Average of 42 cows of the Agricultural Institute, Dublin	13·40	4·00	9 40	·70
Davenport. Boston average of 3 dairies of 56 cows	13 45	3 79	9 66	66
Sharples Report of American Academy of Sciences — average of 19 cows	14·49	4 83	9·66	·66
Average of the above 16 authorities	13 53	4 04	9·55	68

In the month of November, 1885, 100 samples of milk, from as many vendors, were analyzed by the Milk Inspector of Boston. Of these ten were complained of in the municipal court.

The average of these samples, including those below standard, was as follows:

Total solids	13 00
Fat	3·37
Solids not fat	9·64
Ash	·62

The experience of individual owners who are known to keep cows for profit, and the animals kept *without* gain at the Guelph College are known as furnishing milk with a composition above the one urged for adoption here.

It is a well known fact that milk producers and vendors invariably accommodate themselves to the requirements of law. As soon as a new law comes into force there is an immediate change of conduct on the part of those affected by it.

If the creameries and cheese factories had no better milk

than our city supplies, to work upon the business would soon cease to be remunerative. Few of those pay as high a price as ten cents per gallon for milk, while all the milk sold in cities is at from five to eight cents per quart—according to quality and locality.

If it be desirable to guard the interest of the ignorant, the dirty and incapable by avoiding a standard too high, by all means do so; but let us not be restricted to the minimum. We have grades of flour, pork, grain, fertilizers, and other goods subject to inspection, and why not of milk? If we must have a low grade, why not a middle, and a high grade also? If to be on the safe side for prosecutions, why cannot we take the average as our standard and one better as our high grade? Thus we might adopt the following:

Grades.	*Solids.*	*Fat.*
No. 1 Quality	14·00	4·75
No. 2 Quality	13·00	4·00
No. 3 Quality	12.00	3·50

The following range of values accords with commercial experience—milk having only 3 to 3½ per cent. of fat sells at from five to six cents per quart in the principal cities:

	Butter Fat, per cent.	*Price per quart.*
Milk containing up to	3·0	5 cents.
" " "	3.6	6 "
" " "	4·2	7 "
" " "	4.8	8 "
Rich Jersey or Guernsey	5.4	10 "

The above prices are obtained in Montreal and Toronto—though the content of fat is not always uniform when the price is below seven cents. Dealers should be required to state which quality of milk they supply—number one, two, or three.

There is no surer way of protecting milk for town and city consumption than by ensuring that it shall first be from well fed cows; such milk will be sound, and be better cared for by the vendors than the thin and poorer qualities

From the Dairyman. JAMES CHEESMAN.

The Sources of Phosphoric Acid

CHARLESTON ROCK PHOSPHATE.

EDS. COUNTRY GENTLEMAN—To those of us who must buy fertilizers, how cheapest to get phosphoric acid is the question (Kainit and wood ashes supply the potash.) Shall it be animal bones at say $35 per ton, acid phosphate (phosphate rock treated with sulphuric acid), or the same rock ground fine (floats) in its natural state? This latter contains 55 to 60 per cent of phosphate of lime, and can be had at but little over one-third the cost of the pure ground bone. But in the untreated rock the phosphoric acid is in an unavailable form, hence acts slowly. *Questions*—How slowly on heavy clay land, especially on grass? (1) Would we eventually get all the phosphoric acid in the rock? In how many years the greater part? (2) Would using the floats as an absorbent of urine and for disinfecting stables promote its decomposition and render it sooner available as plant food? (3) I had thought of broadcasting it on grass and grain and letting winter's frosts have their full influence. I am offered Lister's ground bone here at $35 per ton; acid phosphate, with 13 to 14 per cent of available phosphoric acid, at $16.50; floats (very finely ground Charleston rock) at $13.50; and containing 55 to 60 per cent of phosphate of lime.

T. B. B., *Newburgh, N. Y.*

[*Answer by Prof.* S. W. JOHNSON, *New-Haven, Conn.*]

A satisfactory answer to the question, which will be the most advantageous to apply—one pound or one hundred weight of phosphoric acid in the form of finely ground "floats," in that of South Carolina rock in the ordinary state of pulverization found in commerce, in that of "bone," or finally in that of "plain-superphosphate" or "dissolved South Carolina rock," can only be given on the basis of actual experience or trial on soil and crop, and under climate and circumstances closely similar to those which belong to the case in view.

The different effect of the phophoric acid in the several sources of it above named, is due simply and solely to its different solubility. In none of them is it entirely insoluble and unavailable. There can be no doubt that enough ground South Carolina rock, or *enough* even of "spent bone black," or of "ground Canadian apatite "(1) (which are commonly reckoned as the least available forms of phosphoric acid supply), admixed with any soil, would effectuality fertilize it in respect to phosphoric acid. Apatite is indeed the most commonly occuring phosphate in the rocks from which by disintegration, soils often fertile are formed. The microscopic examination of rocks, cut to thin sections for that purpose, very commonly reveals apatite crystals.

On the other hand, the water soluble phosphoric acid of superphosphates (as of dissolved bone or dissolved bone-black, or dissolved S. O. rock, or dissolved apatite) when incorporated with the soil gradually becomes less soluble, and in some days or weeks is found to be "reverted" and practically insoluble in water, though still readily taken up by plants.

COOKING FEED.

Mr. W. A Henry of the Wisconsin Agricultural Experiment Station writes to the editor of the *American Cultivator* as follows:

In your issue of October 29th you say, in an article on "Warming or Cooking Food:" "When the philosophy of cooked food for stock is better understood the steamer will be more thought of than ever, but it will be used more for slightly warming food and drink than for cooking the same." This seems to me the very best expression that can be given to our knowledge on this important subject up to this date. In the fourth annual report of this station, just issued, will be found a summary of every and all experiments on cooking feed for swine that I can learn have been conducted in America at agricultural colleges or experiment stations. The following gives the results of this investigation:

WISCONSIN EXPERIMENT STATION.	
Cooked barley-meal (four trials) was to uncooked as	93.7 to 100
Cooked corn-meal (two trials) was to uncooked as	81.0 to 100
Cooked corn-meal and shorts (two trials) was to uncooked as	96.1 to 100
Cooked whole corn and shorts (two trials) was to uncooked as	85.8 to 100
ONTARIO AGRICULTURAL COLLEGE.	
Cooked peas (two trials) were to uncooked as	84.9 to 150
MICHIGAN AGRICULTURAL COLLEGE.	
Scalded corn and oat-meal was to wet meal as	101.7 to 100
KANSAS AGRICULTURAL COLLEGE.	
Cooked shelled corn was to uncooked corn as	84.0 to 100
IOWA AGRICULTURAL COLLEGE.	
Cooked shelled corn (two trials) was to uncooked as	82.3 to 100

(1) Utterly useless unless dissolved in acid after grinding.

A. R. J. F.

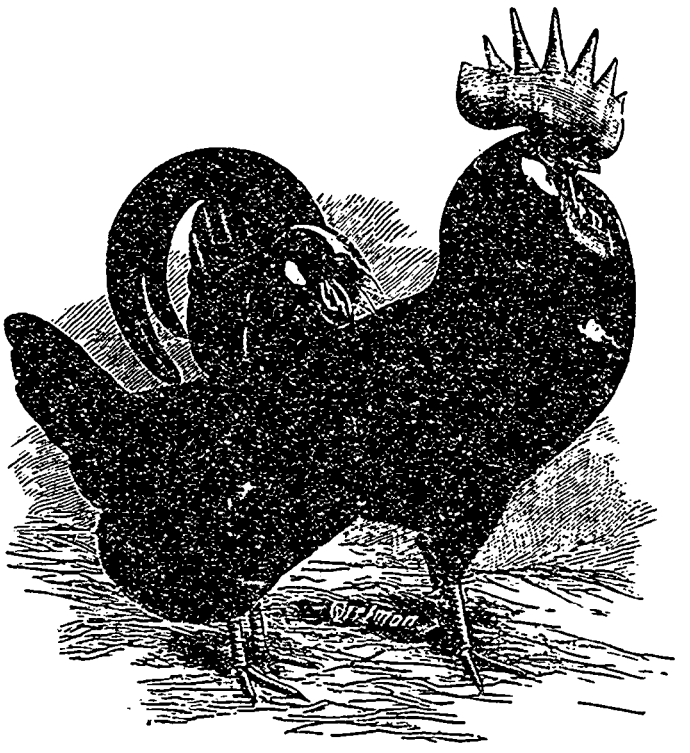
Cooked corn-meal (two trials) was to uncooked as..... 79.3 to 100

MAINE AGRICULTURAL COLLEGE.

Cooked corn-meal (nine trials) was to uncooked as..... 82.9 to 100

EDS. COUNTRY GENTLEMAN—I estimate the leaves cut from two acres of Swedish turnips to be equal in food value, for the hogs, to a ton of meal. This gives them a money value of $23. (1) They are worth more than this for food, as they help to make the meal fed to the hogs more valuable. This is a point in stock feeding which farmers rarely appreciate. It is illustrated in this way. On this farm, there were twenty old sows to be turned off. The reason they are to be fattened is because young sows are better. This is my rule, every year, to turn off the most of the old ones and to select out the best young ones for breeders. There is considerable solid wisdom in this plan. My hogs are all the time growing, and when grown they have only to be fattened to turn them into pork. These sows have all had pigs and reared them. This leaves them in a gaunt and hungry condition. To fill them up on clear meal would be too expensive, with the present relations of meal and pork as to money. Something cheaper must be provided. A pasture of fresh aftermath gave them a good start. Then they had a little meal with a few pumpkins. This was in the same line. Next came the leaves of the turnips with some meal. They keep full all of the time. The leaves are succulent food and there is a considerable amount of growth in them. They keep the hogs in a perfect state of health, and combined with rye, ground entire, the food is well balanced.

L. D. CURTIS.



TYPICAL BLACK MINORCA FOWLS.

The Source of the Carbon in Plants.

BY SIR J. B. LAWES, BART, LL. D., F. R. S.

EDS. COUNTRY GENTLEMAN - Although a considerable number of experiments under glass have proved, to the satisfaction of most people, that the atmosphere is the main, if not the only, source of the carbon in green plants, there are many agriculturists who still hold to the opinion that it is the soil, and not the atmosphere, which supplies the carbon. They argue that considering the large quantity of carbon, amounting to 2000 or 3000 pounds, which can be found upon an acre of land, and the minute proportion of carbonic acid which exists in the atmosphere, it is almost impossible for plants to absorb this quantity during the short period of active vegetation.

It is in answer to several correspondents in the States that I make the following remarks:

I am not aware of any field experiments which bear on the source of the carbon in plants, except those which have been carried out on our own fields, and it is very doubtful whether there are any fields except our own on which a competent answer could be given to the question. It is quite true that we have not published any results bearing upon the question, as we considered that the fact had been sufficiently established by de Saussure at the beginning of the century, and by Boussingault, and many others, more recently. It is however more satisfactory, and especially among agriculturists, that questions which bear upon the crops grown should be proved in the field, as there are many who are not satisfied with laboratory or pot experiments until similar results have been obtained on acres.

The source of the nitrogen in the leguminosæ affords a good illustration on this point. A large number of experiments with soils and sand placed in pots have shown that soils without vegetation, and soils containing leguminous plants, obtain a considerable amount of nitrogen from some unknown source. On the other hand, there is no evidence up to the present time to prove that the whole of the nitrogen contained in the plants is not derived from the soil. (1)

Owing to the varying character of the subsoils of our fields at Rothamsted, the most careful analyses have failed to detect any difference in the amount of nitrogen which they contain after the growth of several crops of leguminous plants, which remove large quantities of nitrogen, and the subsoils where wheat is grown close to them, which removes comparatively small quantities of nitrogen. With regard to the carbon the same difficulties do not occur. The amount removed even in a small crop is considerable, while in a large crop, if grown for some years by manures which do not contain any carbon, if it is derived from the soil, it must remove the whole, or so large a proportion as may easily be measured by analyses.

We have in our permanent wheat field 12 acres of land, on which, with the exception of two small spaces, no carbonaceous manure has been applied for nearly half a century. I will select out of these the permanently unmanured land, and the land which receives a large dressing of mineral manures and salts of ammonia. The average annual yield of this latter experiment is 36 bushels of wheat and 4480 pounds of straw

(1) Eleven dollars fifty cents as the value of an acre of swede tops! As by the time the turnips are carted to the root-cellar the tops do not, I think, weigh more than four tons an acre, this makes them worth nearly $3.00 a ton. A. R. J. F.

(1) So Sir John has not changed his mind on the subject, as I was told he had in September. A. R. J. F.

per acre, making in all 6640 pounds of harvested produce. From this we may deduct one-seventh for water, leaving 5690 pounds. One-half, or 2845 pounds may be recorded as carbon. In 40 years therefore 113,800 pounds of carbon have been obtained from some source. The amount of carbon removed from the unmanured land may be taken as about one-third that of the manured plots. Very careful analyses have been taken of the soil and subsoil of these two experiments, as well as of the soil of all the experiments in the field. The total weight of the carbon found on the acre of the highly manured plot, at the three depths of 9 inches each, or 27 inches below the surface, was 61.916 pounds, or not much more than one-half of all the carbon removed in the crops.

In the soil of the unmanured land, which only removed about one third of the weight of carbon in the crops, the amount of carbon in the soil at the same depth was 53,768 pounds, or much less therefore than that on the land growing the large crop. The difference in the carbon is almost entirely in the first 9 inches of the manured land, and it appears that this is probably due to the much larger quantity of stubble and roots which are plowed in every year as the residue of the large crops. The relation between the carbon and the nitrogen in the soil is about 50 parts of carbon to 1 of nitrogen, and this relation does not vary much so long as carbon is not added to the soil, for although we estimate that the unmanured soil may have lost more than 1000 pounds per acre of its nitrogen, it must at the same time have lost 10,000 pounds of its carbon.

It may be observed that I have not adopted the earliest analyses which were made of the carbon and nitrogen, as they are not quite so correct as those made later on. It must be evident, however, that as the yield of the crop shows no tendency to decline, so long as the proper mineral and nitrogenous manures are applied, the removal of 2845 pounds of carbon per acre annually in the crop cannot possibly have its source in the soil, and I would venture to ask those who are skeptical in regard to the source of the carbon in plants, whether the results do not confirm all the previous experiments which have been carried out by so many eminent men of science?

At the recent meeting of the British Association of Manchester, Sir Henry Roscoe, M. P., in his presidential address, made the following remarks upon the source of the carbon in vegetation:

"The phenomena of vegetation, no less than those of the animal world, have, during the last fifty years, been placed by the chemist on an entirely new basis. Although before the publication of Liebig's celebrated report on chemistry and its application to agriculture, presented to the British Association in 1840, much had been done,—many fundamental facts had been established,—still Liebig's report marks an era in that he not only gathered up in a masterly fashion the results of previous workers, but put forward his own original views with a boldness, and frequently with a sagacity, which gave a vast stimulus and interest to the questions at issue. As a proof of this, I may remind you of the attack which he made on, and the complete victory which he gained over, the humus theory. Although Saussure and others had already done much to destroy the basis of this theory, yet the fact remained that vegetable physiologists, up to 1840, continued to hold to the opinion that humus, or decayed vegetable matter, was the only source of the carbon of vegetation. Liebig, giving due consideration to the labors of Saussure, came to the conclusion that it was absolutely impossible that the carbon deposited as vegetable tissue over a given area, as, for instance, over an area of forest land, could be derived from humus, which is itself the result of the decay of vegetable matter. He asserted that the whole of the carbon of vegetation is obtained from the atmospheric carbonic acid, which, though only present in the small relative proportion of 4 parts in 10,000 of air, is contained in such absolutely large quantity that if all the vegetation on the earth's surface were burnt, the proportion of carbonic acid which would thus be thrown into the air would not be sufficient to double the present amount.

"That this conclusion of Liebig's is correct, needed experimental proof, but such proof could only be given by long continued and laborious experiment, and this serves to show that chemical research is not now confined to laboratory experiments lasting, perhaps, a few minutes, but that it has invaded the domain of agriculture as well as of physiology, and reckons the period of her observations in the field, not by minutes, but by years. It is to our English agricultural chemists, Lawes and Gilbert, that we owe the complete experimental proof required. And it is true that this experiment was a long and tedious one, for it has taken forty-four years to give definite reply. At Rothamsted a plot was set apart for the growth of wheat. For forty-four successive years that field has grown wheat without any addition of any carbonized manure, so that the only possible source from which the plant could obtain for its growth is the atmospheric carbonic acid. Now the quantity of carbon which, on an average, was removed in the form of wheat and straw from a plot manured only with mineral matter was 1000 pounds, while on another plot, for which a nitrogenous manure was employed, 1500 pounds more carbon was annually removed; or 2500 pounds of carbon are removed by this crop annually without the addition of any carbonaceous manure. So that Liebig's provision has received a complete experimental verification."

These remarks were made by Sir Henry Roscoe without his having seen the analyses of the carbon in our soils. If so accurate a chemist considers that the source of the carbon in plants is established by our experiments without the overwhelming evidence which these analyses bring out, I think those who have already had doubts on the subject can no longer hesitate to accept as a well established fact, that the atmosphere is the source of carbon in plants.

Rothamsted, England, Oct. 31.

Cattle Classes at Chicago Fat Stock Show.

PROFESSOR G. E. MORROW.

Butchers as judges; Short-horns first; Aberdeen-Angus a close second; block and show-ring awards differ; Angus and high-grade Short-horn herds best; grades ahead at the block; heavy weights; table of gains per day, deductions therefrom; early marketing indicated.

The awards at the Chicago Fat Stock Show, just closed, were made by butchers, some of whom also had experience as feeders and exhibitors of fat cattle. As a whole, the work was more critically done than in any former year. The results showed the correctness of first impressions that, while no one breed had a clear lead of all others, the Short-horns stood first, with the Angus a close second in merit. The Herefords did well in the younger classes, and grade Galloways, Sussex and Devons, all brought credit to their feeders. It is never to be forgotten that the skill of the feeder and showman has almost as much to do with success at these shows as have the capabilities of the breed or individual animal.

As has been the rule, the carcass prizes were not taken by the prize-winners on foot, but most of these are said to have given good carcasses, somewhat over-fat, of course, but free from mounds and bunches of tallow or of oily blubber.

The sweepstakes herd was Mr. Harvey's Aberdeen-Angus, one of the finest lots of cattle ever shown at Chicago, with the Iowa high grade Short-horn herd of Mr. Moniger so

nearly its equal that the committee divided. This latter herd contained the two-year old steer declared the best animal in the show, and the three-year-old winner over all three-year-olds shown. They were full brothers, bred and fed by the exhibitor. The sweepstakes yearling was a Hereford, and so was the sweepstakes calf. The sweepstakes carcass prize was awarded to a two-year-old half-blood Galloway which had attracted little attention alive. The prize for three-year-olds went to a Galloway-Hereford cross; that for yearlings to an Angus.

A few large steers were shown, not counting those in "side shows." One weighed 3,185 pounds, and had no other recommendation. In the regular classes there were some remarkable weights for age, perhaps the most noticeable case being that of a pure bred Short-horn yearling weighing 1,685 pounds.

A comparison of the weights by ages, with gain per day of the various classes shown, is interesting and valuable, much more so than such facts concerning any one or two animals. The accompanying table gives these facts for the classes in which more than one animal was exhibited.

Breed.	Age in yrs.	No. Shown	Age in days.	Av. W't.	Gain per day	Heaviest in class.
Angus.....	2	3	1057	1802	1.70	1995
	1	5	604	1285	2.11	1500
Devons	3	2	1331	1512	1.14	1665
	2	3	1015	1435	1.41	1495
	1	3	578	1053	1.82	1105
		2	195	550	2.82	500
Herefords.....	1	4	690	1358	1.97	1545
		4	336	855	2.54	900
Short-horns.... ...	3	4	1285	1975	1.54	2185
	2	11	939	1692	1.80	1905
	1	15	632	1384	2.11	1685
		5	320	813	2.73	1035
Grades and crosses.	3	22	1275	1961	1.54	2370
	2	37	985	1685	1.76	2095
	1	37	583	1284	2.20	1605
		12	330	535	2.53	950

In studying this table—and I think it worth columns of the opinions of any man, as showing the possibilities of production of first-class beef cattle—care should be taken to notice comparative age in days of animals in the same class by years. Thus the daily gain of a lot of calves averaging 195 days, ought to be greater than that of a lot averaging 336 days, while the average weight would be much less. The one three-year-old Angus shown weighed 2,225 pounds, and a three-year-old Sussex made a good showing, but these are not included in the table. Aside from the Devons, which average, perhaps, 250 pounds lighter than the others, there are no striking differences between the breeds, the Short-horns and the grades, which were in good part Short-horns, having somewhat the best of the contest.

We are not to accept the figures as representing the most profitable weight at which to market cattle, for even the averages are not reached as a rule in practice, but they do seem to indicate that it ought not to be necessary to keep steers until past three years old before slaughtering them.

University of Illinois.—R. N. Y.

About the Travels of Plant Roots.

Our respected brother who edits the agricultural department of the Brattleboro *Phœnix* copies our remarks on the above subject, and says:

"The above is a rational explanation of the reason that the roots of plants appear to have a kind of instinct that directs them in their search for food. Still it is not conclusive; i is a question whether plants can "only grope blindly in all directions for nutriment." Is it any more for the roots of a plant to turn in the direction where its food is to be found than for the sunflower to turn toward the source of light and heat? If the roots which strike into the richest spots grow fastest, that fact is hardly sufficient to account for their taking the direction of the rich spots, and passing through barren soil, sometimes for a considerable distance, to reach them. If they do not do this a large number of writers, observers and scientists are at fault Professor S. W. Johnson says the length of the roots depends on the nature of the soil. 'Where this is rich, the roots tend to remain; they branch and ramify through all the pores of a small bulk of of earth. Where this is poor, they stretch off and are sparsely distributed. Where they find plenty of food, they grow and ramify upon it. Where nourishment is lacking, they seem *to go in search of it.*'"

Professor S W. Johnson is an authority in agricultural science to whom all must bow. He once wrote to us that our paper (the *Vermont Farmer*) was "remarkable, in comparison with others, for what it *did not* say," referring to the large number of undigested and incorrect statements current in the agricultural press. (1) This was recalled to us by the above quotation from the professor, who *does not* say that plants "go in search" of nourishment, but that they "seem" to do so. It is this very "seeming" which has misled superficial and sentimental writers on the subject. A careless view of the matter gives apparent confirmation to the idea, but when we reflect that a plant has no nervous system, and consequently no senses, we must at once realize that it can have nothing in any way analogous to what is called "instinct" in animals.

The turning of the sunflower to the sun is no more the result of instinct than the rising and falling of the mercury in a thermometer, both being the result of physical causes. The whole question of the action of plant roots, as regards their dispersion in the soil, has been made the subject of many experiments, the results of which prove that in an insoluble soil, of finely divided mineral substance, the roots of plants fed by a watery solution of plant-food will be produced with perfect symmetry on all sides. But if solid but soluble plant-food is distributed in layers, or irregularly in pockets, in such a soil, the development of the roots will coincide with those deposits with perfect accuracy. When a root reaches such deposit it branches so thickly as to perfectly occupy and include it; but as soon as it exhausts the soluble matter there, root fibres are again sent out symmetrically in all directions through the infertile soil, until another fertile spot is found, when the same thing takes place, and will occur again and again, so that when the plant is washed out from the soil in which it was grown the positions of the fertile deposits may be mapped out with perfect accuracy from the roots themselves. It was these experiments to which Professor Johnson no doubt refers, and they thoroughly prove the truth of the views expressed in our remarks, quoted by our friend of the *Phœnix*.

Dr. HOSKINS.

(1) Which in some of the leading agricultural papers in the States are surprisingly numerous. A. R. J. F.

Canadian Agricultural Experiments

The following is a summary of the results of the experiments conducted at the Ontario Agricultural College and Experimental Farm for one year:

(1) Corn fodder newly cut and drawn from the field when green, cut into inch lengths, packed into a common, rough-stone root cellar half under ground, and weighted with six hundred pounds per superficial square yard, can be preserved, except adjoining such a wall, for an indefinite time in a condition fit for animal food, at a cost not exceeding $1 per ton, exclusive of cultivation. (2) In competition with Swede turnips, ensilage corn fodder gave fifteen per cent less milk and thirty per cent less butter and a poorer marketable butter in color.(1)(3) Damaged wheat can be very economically used in the fattening of cattle. Nine pounds per head per day gave a daily increase of two pounds per head per day, at a cost of four and one-fourth cents per pound of the live weight. (4) Rice-meal, in the fattening of cattle, gave a daily increase of 1.81 pounds per head per day by the use of six pounds per head per day, at a cost of about seven cents per pound. (5) Barley-meal in cattle-fattening requires a large amount of other foods in association, and eleven and one-fourth pounds per head per day gave a daily increase of 2 14 pounds per head per day, at a cost of seven cents per pound live weight. (6) Corn-meal took the highest place in a daily rate of increase in the fattening of cattle. Nine and one-fourth pounds per head daily gave 2.31 pounds per head per day, at a cost of five and one-half cents per pound of the added animal weight. (7) Pea-meal gave the second-best daily rate of increase at the least cost of all the regular cattle-feeding grains. (2) Eight and one-half pounds per head daily gave a rate of 2.28 pounds, at a cost of five cents per pound of the weight added to the animal. (8) A pure-bred Short-horn steer can be brought to a weight of 1,700 pounds, when one month under two years old, or a daily rate of increase equal to two and one-half pounds per day. (9) Hereford grade steer calves can be made to average 611 pounds in 238 days, or a rate of two and three-fourths pounds per day. (10) Aberdeen Polled grade steer calves can be made to average 720 pounds in 273 days, or a rate of two and two-thirds pounds per day. (11) During winter a 1,000-pound steer will consume daily ten pounds of hay, thirty-nine pounds of turnips, four pounds of bran and nine pounds of a mixture of grain, upon which it will add 2.11 pounds to its live weight. (1) One pound of added weight to a 1 000-pound steer can be obtained from the use of various materials that contain eleven pounds of dry substances, chemically. (13) By a large variety of experiments with several classes of cattle and many kinds of food we find the actual cost of adding one pound to the live weight of a 1,000-pound animal is six cents to the feeder who grows his own materials and nearly twelve cents when the food is bought in the regular markets—manure and management not considered. (14) Sugar beets, weight for weight with mangels and turnips, and in association with equal kinds and quantities of other foods, gave the highest returns in feeding cattle, or 2 70 pounds per head per day. (15) Mangels gave 2 38 pounds per head per day under similar conditions to the sugar beet.

Fattening Turkeys.

In answer to A. C. L. (page 770) the following is a description of the way in which turkeys are fattened in Norfolk, which is the great English county for breeding these birds, and preparing them for the London markets: Turkeys for Christmas are shut up in a light, dry and roomy house the first week in November; troughs with as much maize and good barley as they can eat should always be by them, and they have two good meals a day of just as much barley meal mixed with skim milk as they can eat, and milk to drink. Sliced mangels, turnips, swedes and cabbage are useful and necessary, and plenty of lime, sand, ashes and brick-dust should be kept in the corners of the house. It is found to be most important that the troughs be well cleaned out every morning, and all surplus food removed, for on a farm there are usually plenty of other fowls to eat up what is left by the turkeys. Fed in this way, they rapidly put on flesh, which is usually very white in color and fine in texture.

STEPHEN BEALE.

H—, England.

(1) Now, in what state was the corn when cut? for on that the whole question depends. A. R. J. F.

(2) Hah! So we have come to the real feeding-stuff at last!
A. R. J. F.

ORCHARD GRASS.

EDS. COUNTRY GENTLEMAN—The soil best suited to orchard grass is a heavy sandy loam; it also grows well in medium and light sands. The richer the soil, provided it has much sand in its composition, the better the growth. Orchard grass, as its name signifies, is a grass better adapted to orchards and shaded lawns than it is to open field culture. Therefore, if clover is sowed with it in field culture, the clover helps to hold the moisture and also shades the roots of the grass, and as they both ripen at the same time, it is more profitable to sow them together, much more so than sowing clover with timothy, as here the clover is dead-ripe, while the timothhy is hardly in blossom. On clay soils, and throughout the Northern States, clover does better with timothy. Timothy does not amount to much on our sandy uplands, and with us our best timothy lands are well-drained flats, adjacent to streams, which are generally stiff alluvials, holding the moisture well and giving for many years first-class crops. Like a great many other mistakes made by merchants in classifying an article—getting at its money value—or a substance that they are not well-informed about as to its food value, timothy hay is valued far more than it is worth. Every farmer who feeds his own stock knows that pure timothy hay is better to sell than to feed.

Orchard grass cut young, mixed with red and white clover, Kentucky blue grass, Maryland blue grass, or *Poa compressa* and Bermuda grass, all of which grasses ripen at the same time here, when made into hay form a perfect feed, not requiring grain except for working horses, and then only three or fours ears of corn daily. This has been my practice for years, and farmers in this section know that my stock always looked well. Your Maryland and Kentucky correspondents should look at their soils and the requirements of this grass to find its value. If the soil and its location is suited to its wants, it is then that it will pay, not otherwise. I have been growing this grass for sixteen years, and I have not yet found any fault with it. I have sold it as mixed hay, and the purchasers are always pleased, and ready to purchase more. My sales have been at top prices. It is the earliest grass for a bite in the spring, as well as the latest in the fall. It is the earliest to be made into hay—the 17th day of May I have often cut it, and the earliest cut hay with me, is always the best.

Orchard grass and the COUNTRY GENTLEMAN are my stand-bys in farming.

F. K. STEELE.

Anne Arundel County, Md., Dec. 33.