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

OFFICIAL PART.

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DE OMNIBUS REBUS.

Box 109, Upper Lachine, Que.
July 18th, 1887.

Cheese.—The price of cheese in the English market, immediately upon the receipt of the first importations from this country and the States, fell from 64s. to about 48s. per 112 lbs. Cheese was worth, here, on the 24th June, eight cents a pound for the best, since which date the price has risen about one cent. During the recent scalding weather, great complaints have been made of the cheese melting. (1)

Pasturage.—If constant feeding without manuring exhausts pasturage, how can we account for the obstinate way in which the *Downs* persist in renewing their verdure every year? Thousands of acres in extent, these striking features in the landscape of the South of England have been fed, year after year, from time immemorial, by sheep, and not only have they never received a load of dung or a ton of artificial manure, but the very droppings of the sheep have been diverted from them to enrich the arable land at their base! For, the flocks that feed on the downs by day, far from passing the night there, are driven down, at 5 o'clock in the afternoon to fold on the ploughed land in the bottoms, in preparation for wheat, and are not let out again till the dew is off in the morning. And yet the pasture on these Downs is, apparently, as close and rapid in growth as ever! Sheep do as well on them as they did fifty years ago, and far as one can judge, there is no deterioration visible. Now, this is a very wonderful thing, and there is only one way in which I can account for it: is the climate of England, from its constant reception of the salt-laden spray of the surrounding sea, full of some subtle provision for the growth of the finer grasses? There is no clover of any sort on these hills. If there ever was any, which I doubt, the sheep have nibbled its heart out long ago.

This matter of the Downs, coupled with the opinion I quoted from our Gloustershire tenants last month—that "they would not hear of constant pasturing impoverishing land"—leads one to this conclusion. we have not yet arrived at a thorough scientific acquaintance with the facts which influence the growth of grass.

Shropshires.—Mr. Wood, of Mount Kisco, N-York, has been having a sparring match with a breeder of Shropshires in defence of his own sheep, which are Hampshire Downs. I refer to this, because there has been some misunderstanding about the Shropshires and their status. In the first place, we are wrong in calling them, as we usually do, *Shropshire*

(1) Best cheese is worth to-day (Aug 23rd) 12½ cents a pound here, and 57s. 6d. per 112 lbs in Liverpool. A. R. J. F.

Downs, there are no *downs* in that county, or within a hundred miles of it. Again, another error is that they were allowed to enter "as a distinct breed" at the Glo'ster meeting of the Royal Agricultural Society of England, in 1852 Now, I happen to have been present at that exhibition, and I have the prize-list before me, in which I read. *Sheep.—Shropshires, or other gray or black faced short wools*, SPECIAL PRIZES OFFERED BY THE HON. ROBERT CLIVE, M. P., not, it will be observed, by the R. A. S. at all. The first of these 4 prizes was won by a Hampshire-down, and the other three by Shropshires, and the observations made by the senior steward, Mr. Milward, were as follows: "The new class of Shropshire Downs was very successful. it is to be hoped that the Society will recognise them as a distinct breed." A clear proof that they were *not* recognised by the R. A. S. as a distinct breed at the Glo'ster show of 1852. Still later, at Plymouth, in 1865, the report of Mr. Dent Dent, the senior steward of the R. A. S. meeting, runs. "There can be no doubt, that in the Shropshires and Oxfords there is some want of agreement as to type among different breeders, and *this want of uniformity* appears to be the weak point in breeds, which, to an unprejudiced eye, appear most valuable producers of both mutton and wool." The judges, too, spoke in the same strain. At the Chester meeting of the Royal, in 1858, the Shropshires were still lumped in with the other short-wools, including Oxfords, Hampshire-downs, and West-country downs, and even Cheviots! The West county downs, or Wiltshire-downs, as they are sometimes called, are a cross between Hampshire downs and Southdowns, and first rate mutton they are. They won the 1st and second prize for their owner, in the shearling class; Shropshires took first and second for old rams, and the West downs first for young ewes. To this report, the judges add: "This competition of "other short-woolled sheep, not being South-downs," requires the consideration of the Council as to whether they can be separated into *distinct classes* of *established breeds*": a clear proof again that the Shropshires were not considered to have arrived at a fixity of type in 1858. As to the Shropshires claim to purity of descent hear what Mr. Coleman says in his prize essay on the "Management of Sheep stock," v. Ag. Soc. Journal, p. 240, 1865:

"For the production of mutton and wool on soils favourable for sheep-culture, breeds derived from a cross of the Long and Short-wools—such as the Shropshire, the Oxfordshire and the Down-Leicester sheep will generally prove most profitable. * * * — The Shropshire sheep are peculiarly valuable in the West Midland Counties, and are rapidly increasing over a considerable area; they follow the Downs rather than the Long-wools in character." Of course they do, since the Downs to which in part, they owe their parentage, came from the flock of Ellman of Glynde, Sussex, and had been so long bred without a cross that their pre-potency must have been very great indeed. Hear what Mr. Thomas Elman said on this subject, at the meeting of the Weekly Council of the R. A. S, March 2nd, 1865:

"What shall we say of the Shropshires? At the Canterbury show, it was forcibly recalled to my recollection that thirty years ago (i. e. in 1835) I had sent some Down tups to Mr. Whitmore, in Shropshire, when I came across some of his sheep there (at Canterbury) exhibited. I then expressed my misgiving to my companion, who exclaimed, "What! do you doubt the purity of Mr. Whitmore's breed?" To which I could only say that I did not know whether he had lately made a change, but if not, I *knew* of an admixture in the blood."

And Professor Coleman, heretofore of the Agricultural College at Cirencester, said, at the same Council meeting. "In my opinion, fixity of type may in time be imparted to a breed of mixed origin by a careful rejection of unfavourable specimens. The Shropshire sheep is an instance of success in such arrangement, for no doubt some Southdown blood had been infused into the breed."

The original Shropshire sheep must have carried a fleece of very fine wool, for I find in Smith's "History of wool and the woollen Manufacture" that in 1341 the sack of Shropshire (Salop) wool was worth twenty shillings more than the next best, and sixty-five shillings more than the worst wool grown in England in that year. Anderson, also, in his "Origin of Commerce," quotes Shropshire wool, in 1743, at £9. 6s. 8d. a sack, Oxford at £8. 13s. 4d., Hereford and Glo'ster at £8, and Cornwall at £4.

So, upon the whole, I think we may fairly say that the Shropshire is a cross-bred sheep between the Long wool and the Down, that it has been now for some years carefully bred, until at last fixed type of sheep has been secured, that it is a most valuable producer of mutton and wool, superior to the Southdown in size and, perhaps, in precocity, but inferior to the Hampshire-down in both qualities. If, in a word, I could not get Hampshire-downs, I would breed Shropshires, particularly if my land afforded a rich bite of grass throughout the summer.

Wheat-crop.—So far from following slavishly in the course pursued by their brother-farmers in England, the Scotch, like the rare men of business they are, grow very little wheat. If you tell an Irishman that the climate of his country forbids the profitable growth of wheat, he resents it as an insult—in fact, a great friend of mine, in former days, Mr. Staunton Lynch, took the trouble to send all the way to Galway for a sample to show me, when I hinted that it was hazardous to sow wheat in such a damp climate—; but the canny North Briton finds that oats pay him better, and consequently prefers that cereal. Still, I was surprised to find how very little wheat was really produced in Scotland; for instance, in the year 1854, the county of Norfolk grew 1,290.373 bushels more wheat than all the land north of Tweed, the acreage sown in the English county, three-fourths of which are naturally *very* poor land, being 202 971 acres, and the yield 6,139,872 bushels, or thirty bushels and a peck to the acre. Scotch farmers only sow wheat on land that is thoroughly fitted to bear that crop, and I have no doubt that on the whole, the yield per acre in Scotland is greater than in England; but, as a general thing, oats pay them better than wheat, and so they sow oats. I wish I could see something of this wise and thoughtful proceeding in this province; but here every man must grow what he wants for the supply of the house, whether it suits the land or not.

ARTHUR R. JENNER FUST.

Lawes on Wheat and Turnips.

As I found lately, in a quarter in which I should not have looked for it, an utter misconception of the conclusions at which Sir John Lawes and his coadjutor Dr. Gilbert arrived after long experience in the cultivation of wheat and turnips, I propose to give an account of their earlier experiments in the use of manures for those crops, showing, 1st, why the experiments were undertaken, 2nd, by what means the land was prepared for them, 3rd, what the experiments were; and, lastly, what the experiments proved. If I succeed in my attempt, the readers of this journal will see at any time by a glance at the analysis, whether any special manure which may be offered to him be fitter for one or the other of the two crops treated of in this article.

Somewhere about the year 1840, professor Liebig, of the University of Giessen, published his celebrated work on Organic Chemistry in its relation to Agriculture and Physiology,

and thereby aroused such a spirit of investigation as had never before been known in England Among other labourers in this field, Mr. John Bennett Lawes and Dr. Gilbert, commenced, in 1843, the systematic investigation of the action of chemical combinations when applied as manures to the most important crops of the farm; more especially devoting their attention to the proof or disproof of the startling announcement of what is commonly known as Liebig's *mineral theory*; which is embodied in the following sentence, to be found at page 211 of the third edition of his work on Agricultural Chemistry: "The crops on a field diminish or increase in exact proportion to the diminution or increase of the *mineral* substances conveyed to it in manure?

In a subsequent edition of his work, Liebig still more strongly asserted the truth of his theory; for he says, speaking of the farms of England, "sooner or later, they must see that in this so-called "mineral theory," in its development and ultimate perfection, lies the future of agriculture."

This then was the assertion which Lawes and Gilbert set themselves to disprove: That all that the cultivated plants on a farm required for their support was the mineral matters contained in their ashes!

The first idea that struck them was, that in order to discover what a certain piece of land required to be added to it to enable it to produce a crop, it would be as well to make a chemical analysis of the soil. But, upon consideration, they were deterred from this by the reflection that the addition of a quantity of ammoniacal salt containing 100 lbs. of ammonia —an unusually large dressing = 400 lbs. of sulphate of ammonia—to the acre, would only increase the percentage of ammonia in the soil by 0.0007 or $\frac{7}{10,000}$—the acre of land six inches deep being taken to weigh about 1,344,000 lbs. It is quite clear that no method of analysis would enable the chemist to appreciate the difference between the soil before and after the application. There, we see that they acknowledged at first starting the inutility of seeking to discover the productive power of a soil from its percentage composition, a position that I have maintained many a time in this periodical.

The next question that the two partners in these trials asked themselves was: In what condition should the land be to make it fit for replying fully to the inquiries to be propounded to it? Now, the answer involved the following considerations:

Some system or other of rotation is invariably pursued in British agriculture; what is called a *course* of rotation is the period of years which includes the circle of all the different crops grown in that rotation; as a general rule, in the course of rotation no two crops of the same kind are grown consecutively on the same soil. (1) Wheat, for instance is never sown immediately after wheat, but only after some other crop has intervened, and at such a period of the rotation as, by experience, it is known that the soil will, by direct manure or by other means, have recovered its power to produce a profitable yield of that crop.

So, looking at these considerations, it was decided to begin the experiments on land that had just been put through a course of rotation, and which was, in consequence, in what may be called a *practically* exhausted state. And this exhaustion of the soil before trying experiments in manure on it, I esteem of the very highest importance; for I am sure that the utter failure of many of the numerous experiments tried at some of our agricultural colleges, notably at Guelph, may be attributed to the neglect of this precaution.

Thus, it was determined after a full investigation to proceed by way of *synthesis* instead of by the *analytic* method, and in carrying out the inquiry it was decided to take Wheat as the type of cereal plants and Turnips as the type of root-plants. Beans were also experimented on, but as these are rarely grown in this province, I shall not describe this part of the work.

And in order to carry out the experiments in so full a manner as to be convincing to the most sceptical, it was determined to devote 14 acres to the continuous growth of wheat, and 8 acres to the continuous growth of turnips. My readers will please to remember that the experiments began in 1843, and have been continued, though on a much more extensive scale, ever since.

Let us, first, pay attention to the series of experiments on the manures supposed to be adapted to the growth of wheat; for it is here that, as I believe, we shall see more clearly than elsewhere the utter futility of Liebig's mineral theory.

No one doubts that, in the case of vegetation in a native soil, the atmosphere is found to be a sufficient source of the nitrogen and the carbon; but agriculture is essentially an artificial process; and we shall see that, especially as regards the production of wheat, it is only by the accumulation within the soil itself of nitrogen, naturally derived from the atmosphere, rather than of the peculiarly soil-constituents, that our crops can be *increased*.

We have seen that all the experimental fields were selected when they were in a state of agricultural exhaustion—they had grown, that is, the regular number of crops which constitute a rotation since the application of manure. In fact, the wheat-field was regularly scourged, for, since the manured turnip-crop, it had grown barley, pease, wheat, and oats, without any further manuring.

In the first season, the 14 acres intended for wheat were divided into about 20 plots, and it was by the *mineral theory* that Mr. Lawes was mainly guided in the selection of manures, ammonia being, at that time, considered of less importance. Rape-cake, containing, besides some minerals and nitrogen, a certain quantity of *carbonaceous* substance, in which both corn and straw so much abound, was added to one or two of the plots.

I shall not apologise for asking my readers to attend most seriously to the repulsive mass of columns of figures that will pass under their eyes in the tables that follow. I believe with all my heart and understanding that the whole future of the agriculture of all lands, after the first virgin fecundity of the hitherto unbroached riches of their new lands has been deflowered, depends upon a thorough knowledge and appreciation of the perfect truth of the deductions made by our devoted servants and friends from the experiments now under investigation. The labours and studies of all preceding agricultural students fade into nothingness by the side of these noble benefactors to the human race.

Most of my readers will have no difficulty in drawing their own deduction from the above table; but as some readers are too lazy to draw even the simplest lesson from the clearest statement, I may as well say what I see in it:

First, I observe that the natural yield of the more than agriculturally exhausted land at Rothamsted was, in a season which was a bad one for wheat, 16 bushels to the acre—$2\frac{3}{4}$ bushels more than the average yield of the United States; next, that the addition of 14 tons of cake- and grain-fed dung to the acre, only raised the crop by six bushels of grain and 356 lbs. of straw; that the ashes of 14 tons of dung added nothing to the number of bushels, and that the weight of the bushel was by no means improved by the dressing, but, on

(1) In parts of Hampshire, Sussex, and other southern counties in England, I have known the rotation to consist of two root-crops, both fed off by sheep, and then two grain-crops, the latter of which is invariably barley sown down with grass-seeds. The reason for this is that if the barley were to succeed a fed-off crop of roots on these soils, it would lodge, destroy the young grass, and not be fit for the maltster. A. R. J. F.

TABLE I.

HARVEST 1844. SUMMARY OF RESULTS.

DESCRIPTION OF THE MANURES.	Dressed corn per acre in bushels and pecks.	Total grain per acre in lbs.	Straw per acre in lbs.
	bush. pecks.	lbs.	lbs.
Pot 3. Unmanured	16 0	923	1120
Pot 2. 14 tons of farmyard manure	22 0	1276	1476
Pot 4. The ashes of 14 tons of farmyard manure	16 0	888	1104
Pot 15. Maximum produce of 9 plots with artificial mineral manures: Superphos. of lime... 350 lbs; Phos. of magnesia... 168 lbs; Phosphate of potass. 150 lbs; Silicate of potass.... 112 lbs	17 3¼	1096	1240
Pot 8. Minimum produce of 9 plots with artificial manurial manures: Superphos. of lime.. 350 lbs; Phosphate of potass. 364 lbs	16 1	980	1160
Mean of the 9 plots with art. minerals	16 3¾	1009	1155
Mean of 3 plots with minerals and 65 lbs., each, of sulphate of ammonia	21 0	1275	1423
Mean of 2 plots with minerals and 150 lbs. and 300 lbs. of rape-cake respectively	18 1¾	1078	1201
Plot 18. With complex mineral manures and 65 lbs. sulph. am. and 150 lbs. of rapecake	22 3¼	1368	1768

TABLE II.

HARVEST 1845. SELECTED RESULTS.

DESCRIPTION AND QUANTITIES OF MANURES PER ACRE.	Dressed corn per acre in bushels and pecks.	Total grain per acre in lbs.	Straw per acre in lbs.
	bush. pecks	lbs.	lbs
Section 1.			
Plot 3. No manure	23 0¾	1441	2712
" 2. 14 tons farmyard manure	32 0½	1967	3915
Section 2.			
" 5a No manure	22 2¼	1431	2684
" 5b. Top-dressed with 252 lbs. of carbonate ammonia (dissolved) at 3 times during the spring	26 3¾	1732	3599
Section 3.			
" 9 { Sulph am. 168 lbs; Muriate am. 168 " } Top dressed at 1 time	33 1¾	2131	4058
" 10 { Sulph. am. 168 "; Muriate am. 168 " } Top dressed at 4 times	31 3¼	1980	4266

the contrary, was diminished by about 2¼ lbs.: there was, also, a slight decrease in the weight of straw. (1)

Out of the 9 plots treated with mineral manures, we have in no case an increase of 2 bushels; the yield of the average of the 9 being not quite 17 bushels. On the other hand, we see that a *soupçon* of a nitrogenous manure—for 55 lbs. of sulphate of ammonia (= 13 lbs. nitrogen) is a mere pinch of snuff, and the rape-cake does not contain much nitrogen in such a small dose: probably about 8 lbs.—adds 7 bushels to the yield of an acre, surpassing the return made by the exhibition of such a heavy dressing as 14 tons of farmyard dung.

Here, I should remark that the surperphosphate of lime was made by acting upon burnt bone-dust with sulphuric acid, and was therefore free from all organic matter.

If, as I well remember, the summer of 1844 was unpropitious to the growth of wheat, it was not so with the season of the following year. The same *unmanured plot*—exhausted still more by the growth of the wheat-crop of 1844—this exhausted plot, I say, yielded in 1845, 23¾ bushels of wheat, weighing 60 lbs. the bushel, as will be seen in table II.

The plot No. 5, previously ⅔ of an acre, was this year divided into two equal portions, one of these (5a) being unmanured, and the other (5b) was dressed with carbonate of ammonia at the rate of 250 lbs. per acre: the yield by this pure but highly volatile salt alone was 4½ bushels more than on the unmanured plot. And a very remarkable, though by no means enormous increase it is, for so highly volatile a salt is not at all suited as a top-dressing to a soil like Rothamsted, where the large proportion of lime would probably mighty soon chase away the ammonia into the air. Since these trials were made, the late Augustus Voelcker found that even in the case of the *sulphate* of ammonia, a *fixed* salt, the lime so largely contained in the soil of the College farm at Cirencester rendered that manure inoperative, unless it was well harrowed into the land: if used as a top-dressing, the odour of it was perceptible with in twenty-four hours of its application.

In section 2, we see the results of plots 9 and 10, the former of which received the previous year superphosphate of lime and a trifle of sulphate of ammonia, and the latter, superphosphate of lime and silicate of potass. In 1845, to each of these plots 1½ cwt. of sulphate of ammonia, and the same weight of muriate of ammonia, were supplied. on plot 9, the salts were applied at one time, on plot 10, at 4 times. What was the consequence? The produce obtained by these salts of ammonia alone turns out to be 33⅜ bushels, in the one case, and 32 bushels in the other: ten bushels more than the produce yielded by the unmanured land! In fact, the yield of No. 9 exceeds the yield of the land that received 14 tons of dung by about 1¼ bushel, and the yield of No. 10 about equals it, More; if we take the weights of total grain instead of the measure of *dressed* corn, we find that No. 10, manured with ammonia alone, has given 364 lbs. of grain and straw together, more than the plot 2, manured with 14 tons of dung, with all its mineral and carbonaceous constituents.

It was at this last point, that the excellent Philip Pusey aimed, when, forgetting that unlimited supplies of carbonaceous matter is furnished to plants by the atmosphere, he said that "he feared the experiments of Messrs. Lawes and Gilbert would tend to excite an indifference to carbon." It *was* a difficult thing for a man of the times when nothing but bulky dressings of farmyard dung were used as manure, to *feel* that a stout man could carry on his back sufficient "mendment" to increase the yield of an acre of wheat by from ten to fifteen bushels. And I fear that, even now, we should not have to look far before we found a few thousand farmers, who not only do not *feel*, but do not *believe* in, the truth of what I have just shown to be the case. Further on, Mr. Lawes proves clearly that carbon is entirely unnecessary

(1) This is really very surprising at first sight, but when we see that these ashes, though useless for wheat, would, alone, produce a fair crop of turnips, we are forced to confess that Herr Von Lie'g was on the right road—only he missed his way. A. R. J. F.

as a *manurial* addition to land: as an amelioration of the texture and colour of the soil, it is quite a different thing.

Arthur R. Jenner Fust.

(To be continued.)

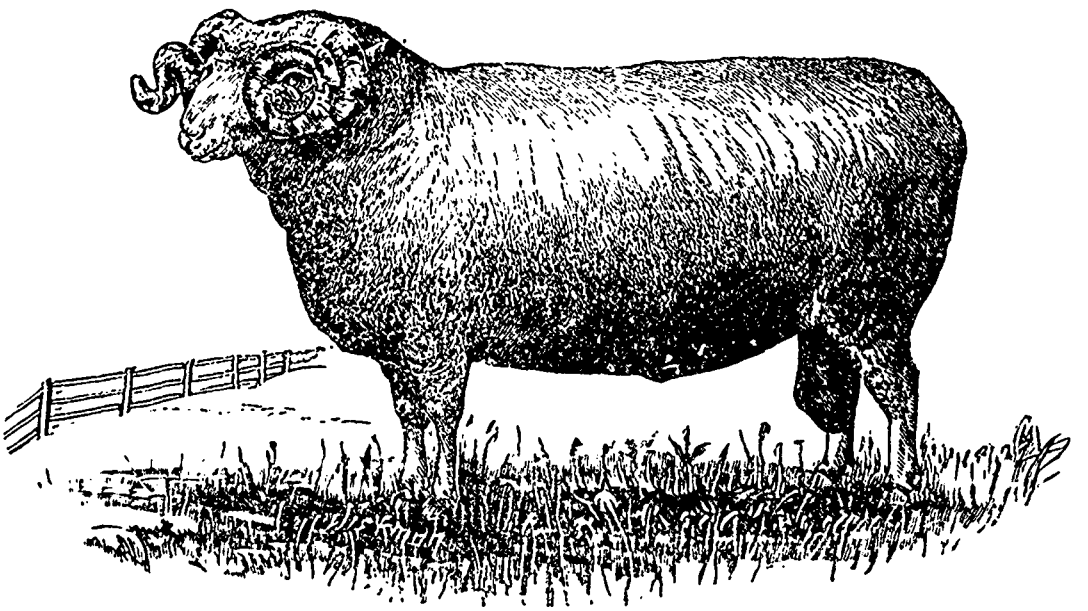
Breeding stock—A very strong effort is being made at present to hinder the too prevalent practice of exhibiting cattle at our annual shows in a state of fat too great for breeding purposes. I do not think, however, it will be successful, for it is a mighty difficult thing for a judge, to determine the limit at which preparation for exhibition should be arrested. A well-bred shorthorn or Hereford cow for instances, in its perfectly natural condition, would strike a breeder of common "scrub" cattle as been far fatter than cows of his own feeding when fit for the butcher; and so of other description of stock. I recollect very well Colonel Townley's shorthorn cow, Victoria, winning, in 1857, the Gold Medal, at the Fat stock exhibition at Birmingham and standing first at the Smithfield Club show of the same year, and yet in the following spring she produced a bull calf, which lived, and neither cow nor calf were a bit the worse. Of one thing I am certain, if judges are too severe in this matter, three-fourths of the principal breeders of the country will refuse to exhibit their stock.

Herefords.—I regret to see the erroneous practice of allowing the calves of this valuable breed to run with their mothers still in vogue. Herefords, as a rule, have but a poor character as milkers, and they are not likely to become more popular if this mode of rearing be persisted in. In 1853, Robert Smith, one of the best known practical farmers in England of his time, an extensive breeder of stock of all kinds, and a man of considerable power of judgment, thus spoke of the custom:

"The calves usually run with their dams in the natural state—a rude state of things, which the breeders ought to alter, as its present effect is to depreciate the value of the whole race. In this thickly populated kingdom it is necessary that both milk and flesh be produced. We hope to be excused for making this allusion, particularly as we are aware that not only can these cattle be greatly improved by cultivation, but that their milk is of a superior quality, and yields a return equal to that of any other breed possessing similar pretensions to flesh." V. Report on the Exhibition of Live Stock at Chester; R. A. S. E., 1857.

Stallions.—I observe the proposal to render the employment of inferior stallions penal! Are we not going a little too rapidly into the idea of "paternal government"? In the time of Henry VIII, a law was made prohibiting the owners of entire horses from allowing them "to be at large"; this was a wise precaution, but the same law contained a provision that nobody should, under penalties, keep a stallion less than 15 hands high! We are not going back to those days, I hope.

Lincolns.—Thirty *tegs*—yearlings—of this fine breed of sheep were shown last Lincoln fair, which clipped, each, 14 lbs. of wool—washed on the sheep before shearing—and, being slaughtered, weight 35 lbs. a quarter. Profitable sheep enough, for the breeder, but defend me from eating their mutton! It is extraordinary how tenacious the Lincolnshire men are of the reputation of their sheep. To hint that a Down sheep may be preferable as mutton to a Lincoln, is almost as great an insult to a Lincolnshire man as to tell a county Galway man that his climate his hardly suitable to wheat!



DORSET HORNED RAM.

Hampshire-downs.—I remark, in some of my exchanges from the United States, an attempt to persuade people that the Hampshire-downs are a *made-up* breed, like the Oxfords. The idea is absurd, as no man, or set of men, in his or their senses, would, when shaping out in his mind the configuration of the animal he wished to establish, have retained the very striking though by no means fascinating head carried by all sheep of this breed. The following I extract from the report of the Senior Steward of Live Stock at the Chester meeting of the English R. A. Soc.:

"The Hampshire sheep are clearly descended from an original hardy race peculiar to the county, possessing in early days the same bony characteristics as the long-woolled Lincoln. They have partaken of the improvements of the other breeds;

but their strength of size and constitution have been retained as characteristic of the animal, less attempt having been made to imitate the beauty and high proof of the Southdowns. These sheep, as seen in numbers upon their native soil are bold, rent-paying animals."

Cows not breeding.—Some cows when in good condition refuse to "stand by the bull." I have lately been requested by a friend to give advice on this point. I recommended him to lower, by degrees, his cows' food, to work them gently in a cart or a roller, and to turn them out to graze in company with a yearling bull. Mr. Cochrane, if I remember rightly, when his shorthorn cows refused to breed at Hillhurst, used to pack them off to Kentucky or Virginia, where, in the Blue-grass district, they seldom failed to retrieve their character. Was it not "Lady Fragrant" that I saw drawing a roller on the lawn at Compton?

Salt.— There is not the least use in sowing salt on poor land or on good land out of condition. Salt has the power of setting free ammonia from soils that have been recently manured with rotten dung, guano, or any other ammoniacal manures, producing on the one hand soda, which becomes fixed in the soil, and on the other chloride of ammonia, which becomes plant food at once. I remember well, about 1848, being surprised to hear that soot and salt combined produced good crops of carrots; but when I came to look into the matter afterwards, I saw that the salt set free the ammonia contained in the soot, and hastened its action on the crop. Salt does not act as a direct manure, but, like lime, as a "cooking" agent. I should certainly use it, perhaps for swedes, and certainly for cabbages and mangels.

"On porous, sandy soils," says Voelcker, "roots, especially when the season happens to be dry, are apt to pass so rapidly through all the stages of growth that their leaves begin to drop before they have had time on the one hand to collect atmospheric food, and on the other to accumulate mineral matter from the soil in sufficient quantity for the development of their bulbs. On such soils, the application of 3 cwt. or 4 cwt. of salt has given me a large increase of roots, and 7 cwt., 8 cwt., or even 9 cwt., so far from doing any harm, increased the produce of mangels by 2½ to 4 tons per acre."

But neither Voelcker nor any other observant man would dream of sowing salt on heavy lands, for it has a remarkable tendency to prolong the period of vegetation, and delay the arrival of maturity. In this province, I fancy most of the sands contain a good deal of chloride of sodium, so I counsel any one who wishes to employ salt as a fertiliser to try a small quantity as an experiment. A cheap source of this substance would be the salt used for packing the hides that are imported hither from South America.

Escutcheons.—I fear, I am sceptical as to the indication of the escutcheon as regards the milking capabilities of a cow. Almost the worst milch-cow I ever saw had a superb "Flandrin" escutcheon. The earliest English notice I find of this point is in the Magazine of the English R. A. Soc. of 1865: "A young *shorthorn* heifer is selected with a view to well-covered flesh-points, early maturity, and fine mellow quality; and there is none of that *Ayrshire* acumen at work which gives laws for the exact shape of a milking vessel, which likes a peculiar feather extending from that vessel up the twist, &c." As far as I can judge from Mr. Hazard's pamphlet on the Guenon system, the latter judged of a milch-cow pretty nearly as I should myself, and the escutcheon was thrown in as a makeweight. If any one will explain to me the connection between the "feather growing up the twist from the udder," and the number of months a cow will hold her milk, I will think over the matter, and if I am convinced I am wrong, I will acknowledge it. I have seen a vast deal of quackery in my time!

Slag.—Here is another "waste matter," which seems to be likely to come into general use. I have no special knowledge of it, but I hear it is the refuse of the Gilchrist process for making steel. It seems to contain a large proportion of phosphoric acid, but whether it will have to be used finely ground, or dissolved in sulphuric acid, I know not. As far as we are concerned, I do not think it matters much, as we have already the "old char" of the sugar-refineries, containing 70 °/₀, at least, of phosphate of lime, and I presume the phosphate of iron in the slag would have to pay the 20 °/₀ duty on importation, so my correspondent, Mr. Bickford West, would not be any the better for it. (v. p. 135 *et infra.*)

Sulphate of iron.—Here, again, is a new, or revived, manure, of which wonderful things are spoken! Copperas, at the rate of 14 lbs. to the eight of an acre of potatoes is said to have produced 5287 lbs., 400 lbs. more than where none was used! Now 21 tons of potatoes to the acre is a rather large crop to be grown with 112 lbs. of a manure that can contain no manurial property except a few pounds of sulphuric acid. And the land where the copperas was not used must have been pretty good to have yielded upwards of nineteen tons of potatoes to the acre! I feel inclined to wait a little for farther information before I invest largely in copperas. And more, since I wrote the above, I am told that this ferric sulphate, when tried with turnips, equalled in effect a good dressing of guano and bone meal, and the hay-crop, too, was doubled!!!

Georgeville, P. Q., 23rd July 1887.

ARTHUR R. JENNER FUST, Esq.,

Dear Sir,

Your reply to Mr. Brookhouse in the July issue of the *Journal of Agriculture* is of much interest to me, as I have some pasture land that requires such treatment as you advise. I last month received a price list from the "Silvertown Chemical Manure Works," London Eng. which, I enclose herewith. Would you kindly inform me which of the preparations here mentioned would take the place of those mentioned in your letter, as there are four or five descriptions of bone-dust specified in the list. The company deliver the manures free of charge on board ship in London. The cost of bringing out here would be about $4 a ton ship-freight, 20 per cent duty and about $3 a ton railway freight to Magog, our nearest railway station. I am afraid this would bring the expense of a good strong manure such as the "Bone meal" priced £5. 12s. 6d. in the list, almost as high as the Canadian manufacturers charge for the article they supply.

Hoping you could find room for an answer to the foregoing in the next number of the *Journal*, I remain,

Your obedient Servant,

BICKFORD WEST,
Georgeville, Que.

Answer.—The bone-meal will answer your purpose perfectly. Thanks to our wise system of Protection, the expense of importation is very great, but you must consider that you have a pure article for your money, and a gross ton for a small ton, a clear gain of 240 lbs. I should turn up the meal with twice its bulk of wood-ashes, damp but not wet.

Very truly yours,

ARTHUR R. JENNER FUST.

Georgeville, P. Q, 2nd August, 1887.

ARTHUR R. JENNER FUST, ESQ, UPPER LACHINE, P. Q.

Dear Sir,—Many thanks for your letter of 31st ult. with the information about the bone meal. Would you kindly say what quantity of meal I should apply per acre? Your article in the "Journal" on this subject recommended 448 lbs. of bone dust. Would the same amount of bone meal as supplied by Messrs. Mark Finch & Co., suffice, adding double the bulk of ashes? It is to be hoped the barbarous protective tariff will soon be a thing of the past as no one suffers more from it than the farmer—surely artificial manure above all things should be duty free. I hope to import a ton from London for next season and even after paying all expenses think it will be cheaper than the Canadian article.

Yours respectfully,
BICKFORD WEST.

Answer.—448 lbs. per acre will be enough, with double or, if you can afford it, treble the bulk of hard-wood ashes. Make a round, flat-topped heap of the mixture, damp but not wet; turn it over when it has heated up to, say, 150°., and sow it carefully and equally. Pity you cannot get your bone-meal at Liverpool; superphosphate is to be had there for £2 a ton, and other things in proportion: the Ocean freight, too, would be lower.

ARTHUR R. JENNER FUST.

Contrast.—According to the Rural New-Yorker, in Chatauqua county, N. Y., where one acre of roots used to be sown five years ago, ten acres are sown now. On the other hand, in Orleans county, Vermont, root-growing is still on the decrease, not one-tenth as many are grown as were grown ten years ago. Perhaps, the Vermont people have gone largely into ensilage, and the New-York State people have stuck to the root crop. Any how, the contrast is very curious.

Cheese.—The price of this comestible is, at present, highly satisfactory, good samples fetching as much as 12½ cents a pound! Whether the quantity made is equally satisfactory is another thing—I should say not. The long dry weather must have made the pastures very bare. I fear that too many of the paragraphs we see in the papers about the highly favourable appearance of the crops are inserted by interested parties. The thermometer has been varying from 80° F. to 90° F. for ever so long, and that, even if occasional showers have fallen, does not seem predictive of a heavy yield of dairy-produce. I fancy a good deal of cheese must have melted in its transit to the sea-board. (1)

Cherries.—A fact worth knowing: in Kent, Eng., in which county an enormous number of cherries are grown, we always used to find that if the grass in the orchards was mown, the cherries fell from the trees before ripening.

Potash.—I see it noted that, in Cornwall, Eng., whence comes the great supply of early potatoes for the London market, the use of potash makes the tubers, when cooked, soapy. Have any of my readers found this effect from wood-ashes? By the bye, in the county I have just mentioned, the early potatoes are never earthed up, but carefully hoed until the first of March, when they are left alone until the beginning of May, at which time they are marketed. Can there be any connection between the Canadian *arpent* and the Cornish customary acre? It is rather curious that 100 English statute acres make 83.6 Cornish customary acres, and that 100 arpents should make 83.6 imperial acres: but it is so!

Drains and Guano.—In 1853, it was calculated that the gloriously farmed county of East Lothian had by means of drainage and guano increased its crops by the following quantities:

Wheat	10	bushels	per acre.
Barley	12	"	"
Oats	14	"	"
Beans	8	"	"

while potatoes could not be grown to one-half of the then extent without those two agents. Remark, please, that the *increase* of the wheat-crop is more than the whole average of the acreage yield of that cereal in our province! Is it not worth while trying to do something of the sort?

Cavalry Horses.—Mr. Stanhope, Secretary at war (what a delightful post!), declared in the House the other day, that the hope entertained of purchasing remounts for the British army in Canada was utterly fallacious. The horses, he said, were good enough, but the prices asked were irreconcilable with that economy which &c., &c., &c. So that staff has broken down with our weight. It does not pay to be too greedy.

Oats.—I remark that in the reports to the R. A. Soc. of England on the prize-farms of the years 1885 and 1886, the quantity of oats sown to the acre varied between 13 pecks and

(1) A shower, or two, has fallen but not enough to do any good. Saturday Aug 6th and two following days were cool, and at Three-Rivers, there were frosts; but to-day, Aug. 16th, it is as hot as ever.
A. R. J. F.

20 pecks. I saw, this spring, an old farmer, who ought to have known better, sowing, on land in good condition, 9 pecks to the acre of black Tartars, which had never been dressed since they left the threshing machine—I do not believe there were more than 7 pecks of good seed sown. I had previously advised him to put on 12 pecks, and I fancy that now he wishes he had followed my advice.

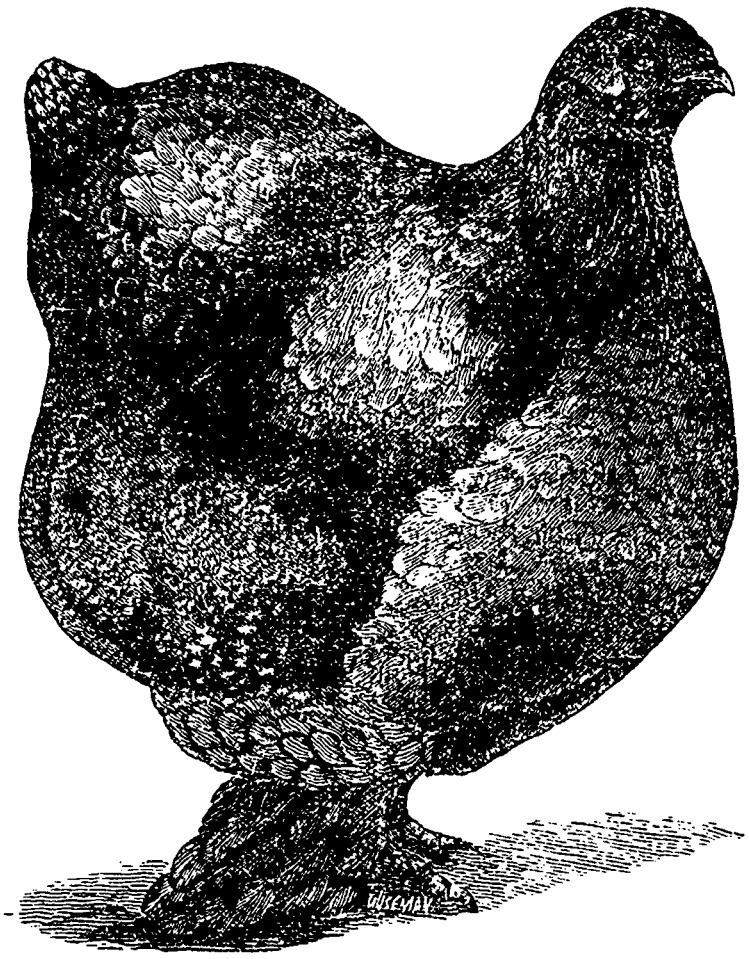
ARTHUR R JENNER FUST.

OUR ENGRAVINGS.

Houdan hen.—See article on, p. 136.

Dorset horned-ram.—See article on, p 136.

Buff Cochin hen.—Bred by Mr. G. H. Proctor, England. Won the following prizes: C. Palace, 1884, first and cup for best buff Cochin in the show; Birmingham, first and £5 5s. for best buff Cochin; Edinburgh, 1884, first.



BUFF COCHIN HEN.

DORSET SHEEP.

The Dorset is a horned breed of sheep which has been preserved intact for a long time, chiefly in Dorset and Somersetshires in the south of England. The original sheep was much smaller in size than the improved Dorsets of today. (1) Within the last few years, owing to more liberal use of turnips, the use of cake and grain, together with very careful selection by eminent breeders, Dorset sheep have, we are assured, by the Editor of the Farmers' Gazette (Dublin), doubled in size and weight of wool. Dorsets have always been unrivaled for producing the earliest fat lambs for the London and other English markets, as the ewes, when highly fed, take the ram in April, or, indeed, at almost any period. The lambs dropped in September are, with good feeding, fit for the market at Christmas. The ewes, too, are ready for the ram immediately after yearning, and may thus produce two crops of lambs a year.(2) They also produce a greater proportion of twins and triplets than any other breed. The Dorchester Agricultural Society offers prizes every year to the shepherds who have raised the greatest number of lambs in proportion to the number of ewes put to the ram in their flocks, and its records show that in 1881 and 1885 the numbers ran as follows. 807 lambs to 700 ewes, 166 lambs to 360 ewes, 762 lambs to 607 ewes, 879 lambs to 710 ewes; 473 lambs to 360 ewes, 404 lambs to 360 ewes; and 574 lambs to 450 ewes. The improved Dorsets are described by the above authority, as straight and deep in the body, with ribs well arched, broad loins and necks well set. They are full in the shoulder without coarseness, and the hind limbs are well let down toward the shank, forming a good leg of mutton. The general features are pleasing, the head standing up well, the horns thin, with symmetrical curl, the eye quick and lively, the face rather long and thin, and the lips and nose pink or flesh colored. The bone is small, giving the appearance of a hardy, useful breed. The ewes are excellent nurses, and the mutton is well flavored. The Dorsets are hardy, quiet and docile, mature early and weigh from 25 to 35 pounds a quarter. The fleece is close and heavy, yielding about six pounds of white, soft clean wool adapted for combing purposes. A few importations of the breed have been made into this country, but they do not seem to have become very popular anywhere, as the South Downs have been generally preferred for the purposes for which the Dorsets are principally prized in England.

The subject of our illustration, p. 133, re-engraved from the London Live Stock Journal, is the Dorset horn ram which won the first prize at the recent Bath and West of England Show at Dorchester—a splendid specimen of the breed.

N. R. Y.-N.

(1) Our Dorset ewes used to die 25 lbs. a quarter. This was 50 years ago. A. R. J. F.

(2) This used not to be a practice in my time, and I do not think it is now? A. R. J. F.

HOUDANS.

This excellent breed of fowls, a typical specimen of which is shown at P. 137, is daily increasing in prominence among American breeders, and seems destined to gain the well-deserved appreciation which it has long maintained in France. The district of Houdan has for years given to the French metropolis the choicest of the table poultry exposed for sale in the public market, and to the breed bearing the name has been accorded the highest praise from the epicures of that nation, who know best the mysteries of the cuisine, and whose approval should make a trademark for the civilized world.

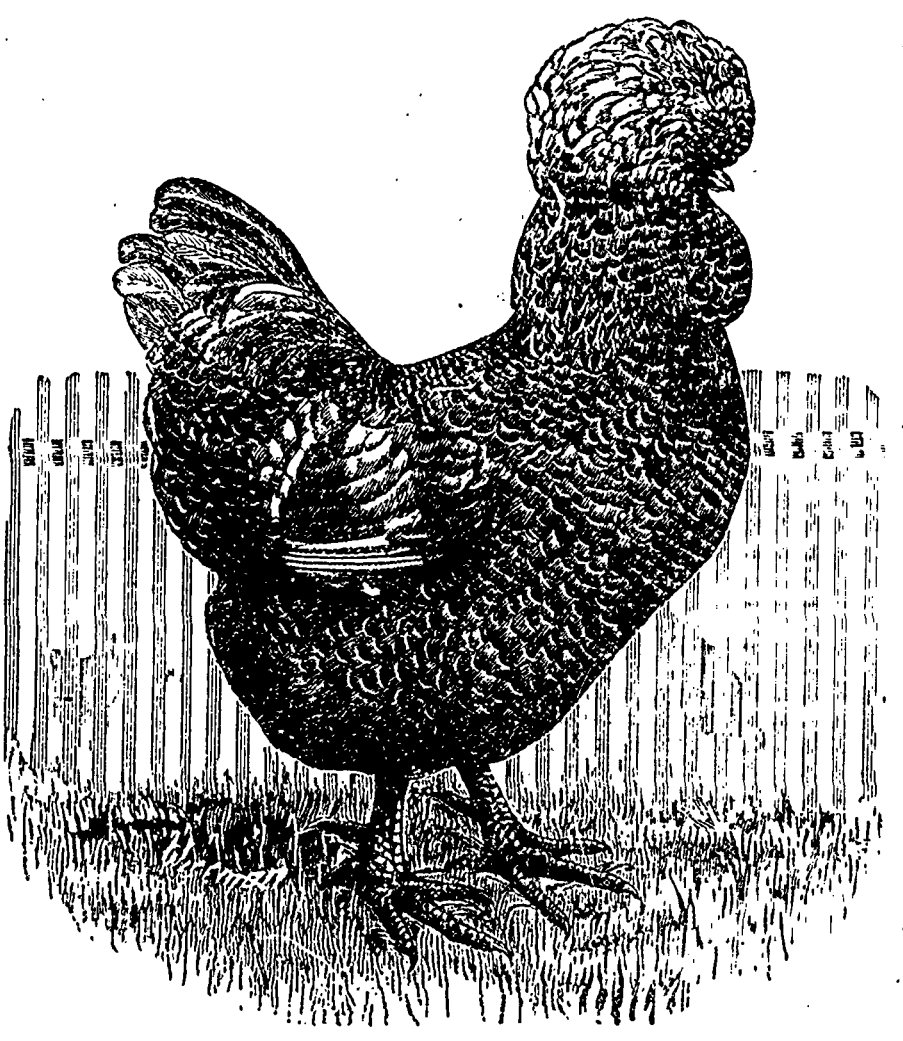
The features, or, in chicken talk, the "points," of the breed are sufficient to gratify any desire for fancy breeding, while in a practical point of view there can be no objection offered by those providing for either market or family use. Seldom, and in most specimens never, showing a disposition to sit, their

physical efforts are given to egg-producing, and while disposed to readily lay on fat, they can, by judicious feeding, be easily kept within bounds. Good foragers, naturally, they are, by reason of their crests, also easily restrained from high flying. By eminent authority they are said to produce, as a breed the greatest weight of eggs in the year, and in number are only excelled by the Leghorns and Hamburghs. Properly mated, the eggs are seldom infertile, the chicks are hardy and active, feathering out rapidly, developing into fine broilers at a very early age, and, old or young, they endure severe cold and heat, but, on account of their crests, require protection from dampness. They are large, heavy-bodied, full-breasted fowls; have short legs and are noted for smallness of bone and absence of much offal. They are one of the few breeds which combine eggs and excellent flesh qualities.

C. E.

ROCKENSTYRE.

R. N. Y.



TYPICAL HOUDAN HEN.

Short rows — "We notice," says the Rural New-Yorker, "many corn-fields where the rows run the short way of the field. The extra work caused by this arrangement will count up by the end of the season. The time spent in turning round is clear loss" — not quite, it gives the horses breathing times — "In marking out the drills, the object should be to have these turns come at the narrow ends of the fields, where they can be reduced to the smallest possible number." All right enough; but the editor forgets another reason why the turns should come at the narrowest part of the field: there will not be nearly as much headland in proportion to the interior part of the piece.

Mr. T B Terry in the Cultivator and Country Gentleman, expresses the hope, that farmers will try sowing rye in their stubbles this fall, and growing a sod that costs almost nothing He writes in good season, so they can make their arrangements if they feel so disposed. On warm, drained soil, in his latitude, rye can be grown from two to four feet high, in time to turn under for either potatoes or corn, except for very early potatoes. He has had it four feet high by the first week in May, when the spring was very forward. On colder land it would not do as well. Any one who had rather have a good sod than bare stubble to plant on next spring, had better look out for some seed rye..... .....

R. Y. N.

This is carrying things a little too far even for Mr. Terry! Did ever man in his senses, who keeps stock of any kind, dream of ploughing in four feet of rye in the first week in May, just when the grass is nearly ready, and when the green-meat is invaluable to gradually prepare the bowels of the cattle for the change from dry food to pasture?

Liver of Sulphur. — What is liver of sulphur? I never heard of it before I read the subjoined extract from the R. Y. N. If it will do all that Mr. Parkins "claims," it must be a valuable article. Last summer, on the Sorel sand, I lost 47 out of 50 cauliflower plants, just as they were heading out, from maggots some thing like those spoken of. Why did they not attack the cabbages planted close to the cauliflowers? I should not have cared about them.

Liver of sulphur for insect pests. — About March 20th last when cutting the lettuce out of a 14-sash cold-frame, I replanted cauliflower, six plants under a sash—84 in all. They grew very nicely until May 25th when I observed that on hot, sunshiny days the leaves would suddenly drop to the ground as cabbages do when affected with club-root. I pulled up one of the plants and discovered a cluster of white maggots about half an inch long at work girding the stalks just below the surface of the ground. I remembered having read in a previous number of the RURAL something about *liver of sulphur* being used to advantage on plants affected by vermin. I procured one ounce of it, dissolved it in three quarts of warm water, and gave each plant one large spoonful, pouring it against the stalk at the surface of the ground so that the liquid might follow the stalk downwards, and at the end of 24 hours I pulled up one of the most badly-affected plants and found the maggots still there, but all dead. The liquid

had killed them so quickly that they could not get away. In three or four days after the application the plants began to revive, and for several days past I have been cutting fine cauliflower heads. As I cut the flower-heads off I pull up the roots and find the maggots still there in form, but dead and decayed This liquid saved my crop.

JOSEPH PERKINS.

Kingston, N. J.

Cream-Separators.—Nothing seems to have interested the public at the English agricultural shows this year so much as the cream-separators; particularly those turned by manual force. These machines carried off the first, second, and third prize offered by Sir Thos. Dyke Acland, at the Devon Society's Show. All three separators were of the Laval make. no one else having dared, it seems, to exhibit. The contests were not severe, as there was no competition; but only fancy, if there had been! Conceive two men grinding away against one another for an hour! From 250 lbs. to 350 lbs. of milk can be separated in the above time by this invaluable implement, which sooner or later will find its place in every farm-dairy in the country, where more than three or four cows are kept.

I see by my later English papers, that there were two machines exhibited at the Dorchester show of the Bath and West of England Ag. society, one of which separated 25 gallons and the other 35 gallons an hour. The price of the former is £19, and of the other £24, or, in round members, $95.00 and $120.00. "Both these machines," says the English Agricultural Gazette, "were found to be well within the control of one man, and to be able to do the work stated to a nicety." Say, the extra cost for fixing would be $25.00, and who would not have one, if it were only to get the skim-milk fresh and sweet to mix with crushed linseed and pease-meal for the calves.

Systems of cream-raising.—There was no doubt about the centrifugals being first in the competition, the sytems coming next in order being the Cooley, the Jersey, the shallow pan, the Devonshire scalding system, and the Swartz. On Monday morning, 16 gallons—160 lbs—of milk, well mixed, from the same vessel, were given out to each of these systems, and the whole set or separated during the week: here follows Voelcker's analysis of the skim-milk:

	Water.	Fat.	Solids not fat.
Separation (steam).....	90·25	·17	9·59
Separation (hand)	90·44	·18	9·38
Jersey system.....	90·01	·62	9·37
Swartz system.....	89 29	1·56	9·15
Cooley system.....	90·11	·51	9·39
Shallow pan system.....	89 76	·86	9 38
Devonshire scalding.....	89·15	·83	10 02

On Friday, the whole of the cream was churned with the subsequent result:

	lbs.	oz.
Devonshire system.....	5.	8½
Hand separator	5.	5¼
Cooley system	4.	14¾
Steam separator.....	4.	14½
Jersey system.....	4.	6½
Shallow pan system.....	3.	14½
Swartz do	3.	4

And the judges decision was that, considering the *weight of butter and quality*, the merits of the various system stand as follows:

First ..... The Jersey system.
Second ..... The Devonshire system.
Third—bracketed— The Cooley and the hand separator system.

It will be observed that the Devonshire system, my favourite, made more butter than any of its competitors from the same quantity of milk, i. e. a pound of butter from 29 lbs. of milk. The much vaunted Swartz was the worst of the lot: a pound of butter from 49 pounds of milk! our old calculation, in England, used to be that two and a half gallons should make a quart of cream, and a quart of cream should make a pound of butter. The quality of the Jersey-system-made butter must have been very good. I should have expected the Devonshire system to have been beaten in quantity by several of its competitors, but not in quality. The reporter of the Agricultural Gazette makes the following observations on the trial:

It will be seen that the gold medal apparatus of the first trial is "nowhere" in this last competition. The explanation, it is plain, is not to be sought in the quantity of butter obtained. The butter here is most, and the skim-milk poorest as before. The trial, however, was altogether and inevitably against the other separator on the score of quality. The cream had been got from warmed milk, and was already five days old when churned. In the other cases the cream had been got from either cooled or scalded milk. and was only four days old. The churning apparatus, too, was not the same in the several cases; and, as we have said, the result inevitable.

Wheat.—In 1805, the western part of the county of Norfolk, England, was covered with heath and other coarse plants. A few wild horned sheep, with long faces, and bare-ribs, wandered over the country, extracting what nourishment they could from the stick-like herbage. The sales of wheat that year, in the market of Norwich, the county-town, amounted to 200,000 bushels. But a few years afterwards, the great Lord Leicester, then Mr. Coke, found out the value of the clay that formed the subsoil of the sandy tract, and the cultivation began to improve. Instead of rye, wheat, with rape-cake, was sown on the clayed sand, turnips were largely cultivated, and the yield of all crops was amazingly increased, so much so, that in 1857, 1,324,000 bushels of wheat were sold in the above-named market, the entire wheat produce of the county being 6,139,872 bushels, or 30 bushels 1 peck to the acre: at least six times as much as was grown 50 years before.

I quote these figures, from Mr. Clare Sewell Read's essay on the "Recent improvements in Norfolk farming", to show that Mr. Ed. A. Barnard's often expressed opinion, that it is by no means impossible to "double or even triple the yield of crops in the province of Quebec," is not so absurd as some of his opponents seem to think: Senator Guèvremont, of Sorel, is decidedly convinced that in two more years the yield of his farm will be doubled.

Change of seed.—I never saw any thing finer than some of the seed-wheat, imported for experimental purposes, by Professor Saunders. The Australian wheat was a perfect picture. But I fear people will be disappointed if they expect the crop this year to turn out a sample anything like that sown. It will take two or three years to acclimatize the grain, as I always found to be the case when I imported Chevalier barley for my friends round Chambly in the days when I had the brewery there.

ARTHUR R. JENNER FUST.

THE HAY HARVEST.

B. F. JOHNSON.

The hay harvest is approaching, and the crop is almost certain to be a light one for the Northwest. Making and securing it by the cheapest and best methods of harvesting are just now matters of interest. Besides, the Red Clover crop has come to cut a prominent figure in great areas in the corn and cattle States, and therefore the harvesting of it by improved practices is of the first importance.

Formerly, and under old methods, Timothy, Red Top, and other grasses in meadows were allowed to stand till dead-ripe before being mown. When the mower, the rake and the pitchfork followed each other without any interval, the time between the standing grass, and the hay in the stack was reduced to a minimum. But when it was thought best to cut the grass at the time of the full bloom, it was customary to set the mower at work in the early morning, spread the swaths before dinner, rake and cock in the afternoon and not cart till the next day, and then, not until the cock had been opened, aired and dried. If the days were clear, dry and hot, the method was a good one; but if wet or foul weather followed, a third of the crop was lost. The risks in curing clover by the old method of cutting in the morning, cocking in the afternoon and suffering the herbage to lie in the cock three or four days to cure, were still greater, and to the extent it would be safe to say 50 per cent, of the clover crop of Central Illinois, within the last 10 years, has been ruined in the processes of saving, or reduced in feeding value so as to be of little or no account.

These accidents to the hay crop have led to the discovery of the new and improved process likely, to be quite extensively practiced by a larger number than ever now that the crop is sure to be a light one, and the market value of hay next year, twice what it has been this.

The new process of clover harvesting is a very simple one, (1) consisting in not starting the mower till the dew is off in the late forenoon of a bright, hot day, and then driving it for all it is worth, till 3 p. m., but cutting no more than can be handled and put in stack or barn the same day. But a bay in a barn with four tight sides is found to be the preferable place to preserve the green clover in; though if stacked in large masses and weighted, the stuff keeps nearly as well. The grass in Timothy, Red Top and Blue Grass meadows, may be successfully treated in the same way, *i. e.* housed or stacked in a wilted and half green state, one of the essentials to success being that every particle of outside moisture must be dried out; else there will be mold when there is a trifle of moisture, and rot when there is a little more.

But there is another essential in these processes, and it is to make this known that these paragraphs have mainly been written. To illustrate: It is found by experience that all do not succeed alike in curing hay and clover, even when the best processes are most conscientiously followed. Thus, Farmer A. may cure his clover and timothy and succeed perfectly; while his neighbor, Farmer B., working just as conscientiously, meets with a failure. Why? The secret seems to lie in this, that in the one case the herbage was in a right state and in the other was not, and that in order to be able to stack green or wilted clover and timothy, and have both keep well in the stack or housed, both must have attained a certain measure of growth and development. (2) Clover must be past full bloom, and Timothy be beyond the second. Thus the secrets of failure with the new processes of curing clover and hay are found to be, first, every particle of moisture must be dried off; and, second, the plants must have reached the stage of full growth. It is easy to understand, of course, how the new processes are more likely to succeed in hot and dry summers than in wet or cool and moist ones; and how much better the new methods are calculated for warm and dry climates than for cool ones. Still, if advantage is taken of the weather, and the work is done in clear, bright, dry days, it can be successfully accomplished as far north as the crops are important ones.

I remember the valuable Hay Harvest Number issued by the RURAL a year or two ago. In it I think the new departure was more than once recommended; but I do not recall a distinct caution that the herbage, to insure success, must have attained a mature stage.

(1) Very simple, and about as bad a process as I can conceive. This is *ensilage* with a vengeance! A. R. J. F.

(2) In other words must be hay before they are cut. Fancy letting clover pass blooming before cutting! A. R. J. F.

HORSE-BREEDING.

The great object of the modern breeder should be to improve and perpetuate their breeds with a strict classification. Hunters should be hunters in make, and not makeshift high-class harness horses, termed hunters solely because they have received a hunting flag. Much time has been wasted since degeneracy and short supply were first ventilated in these columns. Judging by private correspondence, this feature will soon be only historical, and for the honour of England, and the comfort of English homes, I sincerely hope it may be so. With a change in the cultivation of the land, and remunerative prices for beef and mutton, horses were, in a great measure, neglected, and but for a sterling nucleus of reliable brood mares left, we should indeed strive in vain to make up lost ground, not in regard to numbers but decidedly on the side of quality.

Choice of Mares.—When forming a stud, the best mares that money can buy—sound, if blemished—is the initial step for security. Their foals, by a popular sound sire, will always command a high price when ready for sale, and we now have the patent advantages of studbook registration, completely covering the whole ground. This fact alone cuts the ground away from all idle excuses for failure. A worn mare may be used, but no animals suffering from chronic disorders, *e. g.*, of the lungs, or hereditary defect calculated to be handed down. The physical and the nervous system should meet with more intelligent appreciation. It is their just balance that exerts so potent an influence on brilliant performance and produces an enduring sort. These faculties demand strict investigation—neglect this phase and disappointment must ensue. Symmetrical anatomical proportion must be in evidence, for value and courage must be controlled by intellect. Shape and make are indubitably the want of the hour. Coarse, cloddy vulgarity must be tabooed. We want plenty of strength and refinement; real quality. Ewe necks, short necks, upright, short shoulders and round, gummy (fleshy) legs, small odd feet, and unsymmetrical hocks and weak deficient action, are all sources of disappointment.

Choice of the Sire.—Avoid coarse, heavy animals with a long stride, flat sides, badly coupled, and wanting in clean articulation at the throat, bent hocks, twisted cannons, &c. Breed from good looks and vigour, not old favourites. Impostors in size lead up to loss. A nice, tight, quality made one, that steps and goes, hard in colour, sound in constitution, and full of agreeable courage, carrying both ends in an airy, jaunty manner.

The mare must be roomy for breeding, and feminine in character. Both sire and dam require to be long, deep, and wide through their middle; the legs clean, flat, well front in the forehand; *hocks under the point of the hock in the hind-quarter.* Don't breed from blind parents. Many have done this to their sorrow. And if you breed from outside size see that they are wide under their jaws or you will breed "musi-

cians," not horses.(1) Spavins, curbs,and splints must be noted and avoided. Leverage must be present. Good elbows, hocks, and knees, and stifles well up establish in a judge's eye the fact that beauty and ability are handmaids, contributing a daily feast to the eye,a source of annual profit and pleasure to the breeder and practical man. England wants more of the sort.

A horse is all the better for covering his ground naturally long, low, and wide.

Short-bodied, stilty-legged horses a clown could breed, but a master of arts in breeding breeds a horse to fill the eye, and synchronously fill his poket.

Feet should pair, knees and hocks likewise. Action should be uniform, forcible, extensive, light. Dark colours are most in demand.

True talent is the availableness of resource. Don't breed what you like, but what is most in demand in all classes—not one class, as many have done to their prejudice in the past. It is a hobby for me to pick up breeding stock and and stout friends, and my leisure admits of it, so don't apologise for troubling me ; it is a very definite pleasure. R. H. HILHOUSE, *Stallington, Easingwold, Yorkshire.* (2)

Feeding Work-Horses.

Mr P. S. Lacey of Washington writes us that he lost a valuable horse not long ago by careless or ignorant feeding (directed by an incompetent employé), and in meditating on the subject, conceived the idea of asking the publishers of the Star to obtain and publish the practice of some of the heaviest feeders of the city. They did so ; and we copy, below, their account of the interviews referred to :

" You can't lay any rules down about feeding horses," remarked the proprietor of one of the largest livery stables in the city " For different horses you require a change in the method of feeding Large horses require more feed than small horses, and horses that work hard more than those that do little But take a horse in good health and, the quantity of food being regulated by the amount of work he does, I find that the best feed is oats twice a day with cut feed once a day The latter is composed of corn meal, bran and cut hay mixed together. There is no necessity of feeding horses warm food unless they are sick, and while there are a great many kinds of horse feed invented and placed on the market, yet, like human food, the staple articles remain unchanged and form the best and most important element in the feeding of horses. If people allow themselves to be gulled into buying all kinds of concoctions and giving them to their horses they have a perfect right to do so, but they ought not to complain if their horses become sick. There are no substitutes for hay, oats and corn. Now the latter is, in my opinion, rather too heating to be used much as feed during the summer, but I use it during the winter. There is no great secret in the way of feeding horses. All that is needed is to follow the plain simple rules and not adopt the suggestions of every one who comes along. A horse after all is much like a human being and is apt to get sick from pretty much the same causes. If a man treats his horses as well as he does himself, the animal, as a rule, will get along very well. But this would not be a general rule."

(1) By " musicians " is meant broken-winded horses.

A. R. J. F.

(2, There is no re-son on earth why the horse Mr. Hilhouse so graphically pourtra, s should not be bred h re. Pay attention, please. to what he says about the hocks The formation of this part of the horse is very faulty in both Quebec and Ontario.

A. R. J. F.

THE METROPOLITAN RAILROAD HORSES.

The horses of the Metropolitan street railway are in good condition, in spite of the hard work which is their lot. It is supposed to be the most trying life which a horse can lead, and, as a rule, a few years' time uses up the best horse. This natural result, however, is overcome in this instance to a large extent by careful and judicious treatment. " We feed our horses," said Mr. Pearson, the president of the road, " on a mixture of corn, oats and hay, ground separately and then mixed. We find that this is the best food, and in the end the cheapest. There is no change of diet except in cases of sickness, and then the horses are physiced much as human beings are whose systems are out of order. We feed no long hay, because a great portion of hay thus eaten is lodged in the crop, and does not reach the stomach at all. You never heard of a racing horse being fed uncut hay. It interferes with their wind, and so of all horses that are used on the road where speed is a consideration. In the case of car horses, it is necessary that they should be kept going. For instance, on this road a horse works three hours and a half per day and goes sixteen miles. This is a day's work. Of course this three hours and a half is not continuous. There are short intervals of rest. But by feeding our horses three times a day with this feed and cleaning them well, we are able to keep them in good condition and make them useful for years."

THE FIRE DEPARTMENT HORSES.

" We feed on oats principally," said Chief Engineer Cronin, of the fire department, speaking of the horses of the department. " We feed on oats and enough chopped feed to keep the bowels open." (1)

" Do you feed any long or uncut hay ? "

" We give the horses six or eight pounds to stand to at night, but the principal feed is oats; no corn meal. We give a horse a peck and a quarter or a peck and half of oats a day; we feed them three times a day—morning, noon and night—giving them about half a peck each time. Then we give them chopped hay two or three days in a week. We feed our horses very much as race horses are fed. Our veterinary says that oats are best. You will find that the flesh of our horses is very solid. Oats make solid flesh and bone and muscle. Our horses, when they work, have to expend in a short time as much energy as other horses expend in a whole day's work. We could not feed our horses on chopped feed, as I understand some street railroad companies do. It might do for their horses, but it would not do for ours. Half a peck of oats in a horse's stomach is not like half a bushel of chopped feed. The results of our system of feeding are very satisfactory. We never have a case of colic among our horses. The great thing is to give a horse sufficient, and to give it regularly. Water? Oh, we give them water when they want it! Our horses will halloo for it. If they are loose, they will go to the hydrant. We had a horse once that used to go to the hydrant and turn on the water for himself." (2)

Clean Potatoes without Hoeing

EDS. COUNTRY GENTLEMAN—In my last letter about potatoes, the following sentence was used : " But with the tools we have now, we can keep the field almost entirely clean while the crop of potatoes is growing, without any hand-hoeing at

(1) In England, oats are seldom, if ever, given without a portion of hay- *and* straw-chaff. A. R. J. F.

,2, In England, all horses that work hard have a portion of beans (horse-beans) given with the oats. One bushel of beans takes the place of two of oats. Farm-horses generally have 1 bushel of oats and 2 pecks of beans a week. A. R. J. F.

all." This caused Mr J. W. T. of Philadelphia to write, asking for information as to the kind of cultivators or implements we use after the potatoes are planted, and our plan of using them until our crop is matured.

Our potatoes are put in with a planter which leaves the earth over the drill somewhat ridged up. It is perhaps three inches higher than that between the rows, so that one can plainly see where every row is. If the potatoes are planted by hand the same ridge can be made when covering, by using the Victor coverer, which is largely used in Western New-York, or by covering with a cultivator like the Planet Jr., using the side shovels and having them turned to throw the earth in. When used this way, one should drive two horses, as one walking in the furrow would displace the seed. With two, they walk between the drills or hills. The same ridge can be made also by covering with a light plow, but the cultivator will do a much better job. This is an important point, in level culture in particular, to have the earth over the rows higher than between them, as will be seen farther along.

The potatoes being all planted, we may perhaps surprise a new man by telling him to get out a cultivator and go to cultivating between the ridges. We are somewhat ever our hurry then, and work the ground while the potatoes are sprouting in their drills. The Planet Jr., or Higganum, or any of the light one-horse cultivators and horse-hoes combined, with five teeth and a wheel to regulate the depth, will do the business. I have both the kinds mentioned, and know of none better. When my man gets pretty well along with the cultivating, which thoroughly tears up the earth between the drill, I get out my smoothing harrow and start after him, going lengthways of the field and keeping the horses between the ridges, except when turning around at the ends. And now comes the advantage from having the earth ridged over the drills; the harrow takes hold there most thoroughly. Where a field is perfectly level, it will slip over some weeds. For example, if a horse steps on a place that has weeds just coming up, and presses it down a little and packs it, the harrow is apt to slip over it and not kill all the weeds. If this spot is over a hill, then you will have weeds on that hill after a time. With these mellow ridges, and the horses kept between them, so that they cannot pack them, we think we have the best possible conditions for destroying all weeds in the drills without hand work.

It makes no difference if some weeds escape between the rows, as the cultivator will destroy them. Also we have found by experiment, that on our soil the potatoes will not yield quite as well if a heavy horse steps on the ground where a hill is to grow. He packs it very solidly, and it cannot be loosened up again. When he walks between the rows the packed ground can be mellowed again by free use of cultivator and sub-soil plow. Hence we keep them between the rows as much as possible. We harrow on the average, perhaps, once in six days, until the plants are up so we can see the rows. The last harrowing may have to be done crosswise, so as to level down the ridges more thoroughly. We want the ground about level when the sprouts begin to come up. One needs to be careful and do this levelling in time. It will not to do harrow the earth away from the sprouts and leave them suddenly exposed. This was learned by experience. It will do to cover the sprouts deeper; but not to harrow the earth away from them. We want the earth levelled down so that we can use the horse-hoe when the plants are about 8 inches high and the second crop of weeds is just starting, to throw an inch or two of earth in under the tops to smother them. This is all the hilling we ever do.

But now to go back to the harrowing. The all important thing is to harrow *at* the *right time*. A friend once bought a smoothing harrow at my suggestion, to harrow his potato field

He waited until the land was green with weeds, perhaps an inch high and quite tough, and then went in with his harrow and supposed he was master of the situation, because I kept my potatoes clean with the harrow. The next move was to write and abuse me, after putting the harrow in the fence corner.

The weeds should be killed just before they come up: they are very tender then. A touch will destroy them, and then one has saved plant food that they would have used up, and which would not have become available again that season if the weeds had been allowed to grow till 3 inches high before being disturbed. If one harrowed his field three days ago and it looks as though it would rain to-morrow, better harrow again to-day, as when it gets to raining it may keep wet until the weeds get the start of you. The harrowing even three or four times is but a small job, as two acres can be gone over in an hour, but the effectiveness of the work comes largely from the skill of the farmer and from his being wide awake and on time. It must not be forgotten, also, that this frequent stirring of the soil thus keeping the crust broken and letting in the air, is very beneficial. Killing weeds is not the only object of harrowing and cultivating potatoes, by any means.

Our first cultivation after the plants can be seen is with 5 narrow teeth (1¼ inches wide) on the cultivator. With these we can run close to the rows and not throw earth over the little plants, and we can go just about twice as fast as we could with teeth 3 inches wide, such as are commonly used. These teeth are made by the manufacturers of the Planet, Jr., cultivator, or can be made by any good smith.

In general, when the plants are small and roots short, we cultivate wide and deep—give the ground a thorough tearing up. As the plants grow larger the cultivator is narrowed up and the wheel lowered until it does not run over two inches deep. Used at this depth one can do only good and no possible harm, if he keeps at work in the field as long as he can get a horse between the rows without injuring the vines very much. He needs not stop when the blossoms appear. That rule was for deep cultivation. If it is a very dry season he will see the greater benefit from this frequent and shallow working. Like the harrowing, the cultivating also needs to be done at just the right time. It is not enough to cultivate once a week. You want to do it just when it will do the most good. We think this is as soon as the ground is dry enough to go on to after each shower. Thus one breaks the crust or prevents it from forming and lets in the air, and by forming a mulch of mellow earth on the surface, checks evaporation. In a wet season it may not make much difference; but in a dry year, cultivating and forming a mulch the next day after a shower may save hundreds of barrels of water for the crop, which would have gone into the air if the crust had remained unbroken for three or four days longer. Any one knows that a mulch checks evaporation. Two inches of mellow earth is a mulch. Did space allow I could give instances of wonderful returns from cultivation at just the right time, in a dry year. The subsoil plow may be used in connection with the cultivator, while the plants are small, to mellow up the ground. We have used one for the last two years, but do not used it after the roots occupy all the ground, and this is sooner than many think for.

Now, in spite of us, a few weeds will grow in the hills. When these get just above the tops of the potatoes we go through and pull them by hand. It is usually a small job. You will notice I said we kept the field almost entirely clean *while the potatoes were growing*, without any hand-hoeing.

As soon as the tops begin to die, weeds begin to grow on our soil, if it is wet. And then we do not care provided they do not get so large as to interfere with the digging. We like to have something growing all the time. These weeds gather up some of the nitrates that would otherwise go to waste. (I am speaking in particular of after early potatoes.) Then we can cut them all up with the disc harrow, and they will decay and furnish food for the wheat or rye that follows. Even

weeds have their value if properly used. I had much sooner have weeds growing on my land that to have it bare, provided they are not in the way of harvesting the crop and are worked into the soil before they go to seed. T. B. TERRY.

Summit Country. O.

DAIRY HUSBANDRY.

THE TRUTH ABOUT IT.

DAIRYING FALLACIES.

T. H. HOSKINS, M. D.

There have been great advances in the study of the scientifics of dairying, during the last 10 years. Large credit is due to a number of enterprising men, who have devoted both money and time to the investigation of milk and its products, and also to improving the methods of breeding, feeding and handling dairy stock. If I were disposed to criticise anything these investigators have done, it would be the haste some of them have shown to become instructors before acquiring a mastery of their subject. To this we owe much building with "untempered mortar" that has not endured; and, worse than that, the diffusion of erroneous notions among the people, harder to be overcome than a simple, teachable ignorance.

Anxious to avoid the fault myself, and yet desirous to point out what I am thoroughly convinced are serious errors, I shall touch briefly in this article upon some important practical points which have been mis-stated and misunderstood, and about which the popular mind is yet adrift. I do this with some reserve, and only after more than 15 years of practical study, joined to careful closet investigation of both the chemical and physical sides of the question. The public are often at a loss to decide where "doctors" and "professors" disagree; yet I believe that I shall make the points I touch upon sufficiently plain, and shall support my statements with such good reasons that most intelligent and well-experienced practical dairymen will agree with my conclusions.

AIR IN CREAM.

For some time it was thought (and churns to carry out the principle were introduced) that the passage of air into the cream during the process of churning promoted the separation of the butter. This idea is now exploded, and the churns are found only in garrets. I allude to it merely to show, in the light of what will be hereafter stated, how far away from any true conception of the facts the minds of many must have been when such a theory could have had currency.

WITCHES IN THE CREAM.

Not infrequently the correspondence columns of agricultural journals contain queries headed, "Why Don't the Butter Come?" or something equivalent, in which the writer details the painful effort of hours, and even days, over a refractory churnful of cream. Most inexperienced people meet with this trouble, and not a few, also, who have made a good deal of butter, and made it well, when all natural conditions were favorable. The idea expressed by some that the cream was "bewitched," is the last resort, the world over, for the explanation of uncomprehended natural phenomena. It is only in the clear, white light of science (knowledge) that the witch becomes totally invisible. She and the ghost are always best seen in the dark. (1)

(1) Brewers, 50 years ago, were in the habit of making a cross on the top of the "mash" before closing the tun to "keep the witches out." A R J F

TEMPERATURE IN SETTING.

As lately as seven or eight years ago it was the universal teaching that the proper temperature for setting milk was in the vicinity of 60°. The best authorities agreed that at a higher temperature the milk would become sour before all the cream would come to the surface, while at a lower temperature it would never rise at all. When the Swedish method of setting in ice-water was first reported in America it could hardly obtain serious notice, so contrary was it to received notions. Now, it has been abundantly demonstrated that cream swims to the surface soonest in milk cooled nearly to its point of greatest density, or about 40°. This is, in itself, a great advance—probably the greatest single step that has been made in butter-dairying. Yet it was not made by a Professor, but was blundered upon in practice.

THE "CURRENT" THEORY.

Some minds have a great fondness for mystifying plain matters. If one should see a quantity of apples going over a waterfall it would never occur to him that when these apples reached the still water below it would be necessary to "create currents" in the pool before the fruit would float to the surface. The fact that apples are lighter than water would be considered a sufficient reason why they should float upon it, and as it is a rule alike of philosophy and common sense that when we have a perfectly satisfactory reason for any occurrence it is folly to seek for any other, we should never think of a "current" theory. Having ocular evidence that a current submerged the apples, and that they came to the surface when the current abated, we should be satisfied. Now, the butter globule, though it is too small to be seen by the naked eye, is to the milk in which it swims what the apples in the case supposed were to the water. If we keep the milk in a state of agitation they do not rise; if the milk is at rest, and just in proportion as the rest is perfect, they swim to the top. The most rapid separation of cream takes place in that apparatus where the milk is quickest reduced to the proper temperature and most rigidly held there. Whenever you hear one of these "current" theorists holding forth, you will always find that he has a "new patent setting-can" in the anteroom, which he would like to show you. Remember the air-churns and eschew him.

THE ANIMAL ODOR.

That the best butter is now made from cream raised in closed, and even in submerged cans, is what the boys call "a sticker" to those gentlemen who have long and learnedly held forth upon the pernicious "animal odor" in milk, which required the most careful ventilation to be rid of, and which absolutely ruined the flavor and keeping quality of the butter when retained. Various ingenious ways of getting around the stubborn fact are resorted to. It is hard, indeed, after having explained how this "odor" originates, what its chemical formula probably is, and how it looks or would look when isolated, to find it disappear all at once, like a will-o'-the-wisp. No doubt there are "things" in milk, but no doubt, also, they are got there from filthy bags and teats, filthy hands, foul air and the like. Pure, healthy milk has nothing in it that needs to be removed by ventilation. Ventilate your cow stables, keep your cows clean, give them good food and pure water, keep yourself and your surroundings clean while handling the product, from the udder to the butter-tub, and you will never be troubled with the "animal odor." Another ghost has been laid, another "witch" has disappeared.

WASHING BUTTER.

Abundant experiment has shown that the natural flavor

of butter cannot be removed by washing it with pure water. Careful manipulation, with the cream and everything else just right, will make good butter without washing. But the extra trouble is wasted.

THE "GRAIN" OF BUTTER.

When the butter has "come," and appears in little irregular masses, from a pin's head to a large pea in size, is the time to draw off the buttermilk and wash the butter in the churn. This removes most of the buttermilk. After being then gathered and removed from the churn, worked, washed and salted on the butter-worker at the proper temperature, we find upon breaking it that it has a granular look. The mass seems to be made of little particles with a slightly glistening appearance. This is called the "grain." These small particles are partially kept apart by films of water (after salting this water becomes brine), and the peculiar texture thus imparted to the butter is a test of proper manufacture. Overchurn or over-work it, churn or work it at the wrong temperature, and the grain is gone, never to be restored; and with it is gone a large percentage of the selling value of the butter. Enough water (brine) must be retained to produce this appearance, which distinguishes "butter" from "grease." Consequently, the most perfect grain is obtained by washing in the churn before the butter is "gathered."

THE BUTTER GLOBULE.

To those who know nothing of the microscope and its revelations, a world remains hidden of which they can have little comprehension. To the naked eye milk appears a smooth, uniform fluid. To the eye, added by the combination of magnifying glasses, called a "microscope," (seer of little things), it is a translucent fluid, in which float a multitude of shining globes, and these globes are butter in its primitive state. We do not *make* butter when we churn, although we say so. When the process of churning has been continued until we can see little particles of butter in the cream, we say "the butter has come," and the next proceeding (after washing) is to "gather it." But, in reality, churning is a single process. There is no difference between the "coming" and the "gathering," except that the latter is visible, while the former is invisible to the unaided sight. All that we do when we agitate cream in a churn is to throw the butter globules strongly against each other. If the cream is too cold, we may do this forever and produce no butter, for the same reason that we cannot work butter into rolls or prints when it is too cold. The globules are too hard to stick together. They merely rattle against one another in the churn, like peas in a bag. If the cream is too warm, we can churn them together and then churn them apart again, because they are in too fluid a state to hold together against the action of the churn. So no butter comes in either case—there are "witches in the cream." The true exorcist in such trouble is a thermometer.

MORE MYSTIFICATION.

The mystifiers have held high carnival over the butter globule. Nearly all of them (I do not know an exception among dairy "Professors") declare that it has a shell, or envelop of membrane. Having created this shell (as the German philosopher created an elephant, "out of the depths of his moral consciousness"), they have as much trouble with it as they had with the "animal odor." Some tell us that the cream must be kept until acidity is developed, in order to weaken the shell. One has said that the churn must be so constructed as to have a grinding action upon the cream, for the same purpose. A good many have seen the shell, not only upon the globule, but after it has been ruptured and the butter has escaped. They describe it as accurately as they described the "animal odor" when concentrated into a "yellow oil," or as the old lady described the ague which the doctor made her throw up with a dose of lobelia. She said it "looked for all the world like the yolk of an egg."

And yet we know that we can make butter as easily from sweet cream as from sour. We know that we can make butter as quickly by shaking cream in a plain, pine box as when agitated with the most scientific dasher ever invented. We know that at the right temperature we cannot carry a bottle of cream a few miles in a wagon-box without finding butter there at the end of our journey. So far we have common sense *versus* inaccurate science.

If we go further, we shall find that while 20 years ago all physiologists thought they could see a membrane on the little globule (and nothing is more easy than to deceive one's self on this point in using an imperfect instrument, or a good one unskillfully), now more than half of those who have studied the question with ability declare it to be naked. It is really a difficult question to decide. Both optically, with the microscope, and by the use of chemical tests, the highest manual skill and the best mental ability are requisite in the determination of this apparently simple problem. But the writer hopes he may say, without undue egotism, that though "only an ordinary M. D. and farmer," he, 15 years ago, and several times since, has repeated, with many variations, a great variety of tests, both on the optical and chemical side of this "membrane" question, and concluded each time with a firmer conviction that the butter globules swim "bare naked" in the serum of the milk, requiring forcible contact only, at the right temperature, to cause them to adhere to each other and form butter. When he began this study he was not aware that a single prominent scientist held any other view than that the butter globule had an envelope. Now he is happy in finding the majority upon his side, and he looks, in a few years, to see the point demonstrated, by some ingenious experiment, so that there can be no longer any dispute. Practically, it is already proved, since the practice of the dairy would not be at all modified by the demonstration referred to. Its operations are conducted exactly as though an envelope exists, and with perfect results.

Orleans Co., Vt.

LIQUID MANURE.

T. H. HOSKINS, M. D.

The economy of liquid manure is beginning to attract a good deal of attention among progressive farmers. The questions addressed to me on the subject through the RURAL Office are worthy of better answers than I can give. Some time ago, I gave, in this paper, some account of the "manure mines" which a few young Vermont farmers had discovered beneath the old tie ups of their fathers' barns. Much good manure has been excavated from such places, but a vast quantity of accumulated fertility is yet lying unthought of, or unbelieved in, there. In this country a number of farmers have cemented the "substabular" excavations thus made, and are in the habit of drawing out the liquid every spring, sprinkling it thinly upon the mowings just as the grass is starting, with very good results. I find, however, that there are many stubborn unbelievers in the manurial value of urine. Some say it absolutely does no good, while others declare it to be injurious to crops. The fact is, that we have to learn by experience how to use any new fertilizer, and are apt to make many mistakes before we get down to the real facts in the business. Meantime those who are mentally so constituted as to be incapable of anything better than snap judgments, will rush into print with the declarations of things which they have not given a fair trial.

I noticed that your contributor, Bucephalus Brown, lately

gave an analysis of dung and urine, made by Dr. Nichols of Haverhill, Mass., and urged the importance of adding a considerable proportion of phosphoric acid to both of them, in order to utilize the large contents of nitrogen, seemingly greatly in excess in both solids and liquids. As to the nitrogen in dung, even from highly-fed stock, I think it doubtful if it is in so large excess practically, as the analysis would lead one to suppose. The longest testings that have been made by experimenters indicate that rarely more than one-third and never more than one-half of this dung-nitrogen is ever returned to the cultivator in his crops. Inattention to this fact is probably the cause of Mr. Stevenart's rather careless criticism of our friend Bucephalus. But the facts, as collected and set forth in Prof. Storer's invaluable new work on "Agriculture" (lately issued by Charles Scribners' Sons, N Y.) would indicate that Dr. Nichols's analysis was incorrect in a way which, far from exaggerating, greatly understated the incomplete character of urine as a manure. On p. 489 of Vol. 1, Prof. Storer gives a series of urine analyses by Stoeckhardt, showing that there is almost no phosphoric acid in the urine of the sheep and swine, and absolutely none in that of the horse and cows which was analyzed. It is plain, therefore, that in order to get the value there is in urine as plant-food, a large quantity of phosphoric acid must be applied with it to the crop. As to the *quality* of the nitrogen in urine, however, it is far better than that contained in dung, and if properly handled, much the greater part of it can be made to contribute to the growth of the crop. As Prof. Storer well says (p. 490, Vol. 1.), " The nitrogen in mere dung is of very inferior quality to that in urine, since most of it is insoluble and in a condition unassimilable by plants. It is contained chiefly in the undigested, not to say indigestible portions of food, which have been expelled by the animal as useless for its purposes, while the nitrogen in urine is all in solution, and in a condition fit to be immediately taken up by plants. "

It seems to me that the wisest way to utilize the liquid manure is to have it absorbed by litter, and the whole excrement, liquid and solid, along with the absorbents, dropped together into a water-tight cellar. The experience of Ed. A. Barnard, esq., director of Agriculture for the province of Quebec, at his finely managed experimental farm near Three-Rivers, Que., is that when but a reasonable quantity of absorbents, such as can be easily supplied on farms growing a fair variety of crops, is used, the manure in such a cellar while too wet to ferment, is not found in the spring to be wet enough to dip, or be difficult to handle; yet the litter is quite well decomposed, so as to afford no obstruction to its proper and even distribution by Kemp's manure-spreader. (1)

Now it seems evident that, if in connection with any suitable absorbents—straw, sawdust, dry muck or loam—a proper proportion of some phosphatic preparation (say, a plain superphosphate, fine-ground bone, or South Carolina floats) were mixed with the manure daily as made, the resulting dressing would prove to be more perfectly proportioned and combined, and consequently far more economical than it could be made in any other practical way. Certain it is that urine alone, while a powerful " forcing manure," is too strong in nitrogen and too weak in phosphoric acid to give any kind of satisfactory results in the hands of ordinary farmers, destitute of scientific training.

SOILING CROPS

I REGARD soiling as valuable as an adjunct to pasturage and consider it the most economical way of feeding stock, and especially milch cows. If these can have a small night pasture and be stabled in a cool building during the day, and have an abundant supply of green food, they will do much better than when in the best pasture, exposed to heat and flies. I am unable to give definite figures in regard to how many cows can be kept upon an acre, or just how much it costs, never having used the soiling system exclusively, but I will say, emphatically, that it pays. The chief points of advantage are, the increased number of cows that can be kept; the fact that one can nearly control a steady supply of green forage, whereas pastures so often dry up, almost hopelessly destroying their usefulness for a season. Of course, the amount of labor required, is increased, but not in proportion to the increase in products.

I would recommend the following succession as a good one; 1, early-sown fall rye; 2, Orchard Grass, 3, clover; 4, peas and oats, 5, corn; 6, Hungarian Grass or millet. These are given in the order in which they may be cut. Rye can be cut in the early part of May. Before June 1, Orchard Grass is fit for the scythe. (1) Then come clover, peas and corn in regular order. On the ground from which the rye is cut, fodder corn may be planted. From the oat and pea ground a crop of Hungarian Grass or millet may be cut, thus giving two crops in the same season from each piece of land.

I would not recommend sowing fodder corn broadcast, nor cutting it early. Plant in drills three and a half feet apart, and cultivate thoroughly. Don't plant too thickly.

The natural function of the corn plant is to produce corn, and if deprived of this function by crowding, it fails to itself the most valuable contituents of the plant, viz., starch and sugar. For this reason I do not recommend late planting, although I have seen a good growth of stalks from corn planted as late as July 1st; but to my mind they were not very rich food—mostly water.

The above is one succession. It may be varied, or some may find an entirely better one, but I think this will be found good and practicable, to say the least.

E. G. FULLER.

Houghton Farm, Orange Co., N. Y.

(1) Of course, these crops will be from ten to fifteen days later here. A. R. J. F.

(1) But, Dr. Hoskins forgets that Mr. Barnard expressly state that in his stables no litter at all is used. A. R. J. F.

NON-OFFICIAL PART.

Percheron horses at Toronto Fair.

Savage and Farnum of Island Home Stock Farm, Grosse Isle, Wayne Co., Mich., importers and breeders of Percheron horses, have entered thirty seven head of registered Percheron stallions and mares. These thirty-seven are the choicest of their entire stud and will no doubt be an attractive card at the coming Exhibition. This is the largest entry of horses ever made in Canada by a single firm, and the largest number ever made in the United States or Canada except at one fair, and there, out of fifty-two exhibitors, Savage & Farnum showed one tenth of all the horses that were entered, and were awarded twenty-two per cent of all the prizes. Admirers of this famous breed of horses, and those who contemplate purchasing, should not fail to inspect this large number.

Both Mr. Savage and Mr. Barnum will be at the fair with their horses during the Exhibition, and will have comfortable quarters fitted up in which to meet and entertain their friends. They will be glad to make the acquaintance of visitors to the fair with whom they have been corresponding.